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A RESEARCH STUDY OF THE OCCUPATIONAL SAFETY AND HEALTH ACT
OF 1970 AND ITS IMPLICATIONS ON GRAPHIC
ARTS EDUCATION ON THE
SECONDARY LEVEL

BY

RAYMOND EUGENE MAENDELE

A thesis submitted
in partial fulfillment of the requirements for the
degree Master of Science, Major in
Printing Management, South
Dakota State University

1975

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SECONDARY LEVEL

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable as meeting the thesis requirements for this degree, but without implying that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Thesis Adviser

Date

Head, Journalism and Mass Communication
Department

Date

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REM

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PREFACE

A major responsibility of every instructor involved with teaching manipulative skills in the industrial education environment is the safety of the students under his jurisdiction. Therefore one of his ultimate objectives is to prepare his students to work safely while in the lab, safely in his avocational interests, and safely in his future occupational endeavors.

It is the feeling of this writer that possibly excess importance is placed on the mastery of the skills, techniques, and theory of a trade while good safety practices remain as an obscure element of the trade.

It is also the feelings of this writer that many industrial educators are not fully aware of the safety requirements placed on them by the Federal and their state governments. Most of us have, during the last few years, heard reference to OSHA--the Occupational Safety and Health Act of 1970. Yet few of us have received any information as to its implication to the educational system, and more specifically to the industrial educator.

As a member of the International Graphic Arts Education Association, I am annually in personal contact with those I feel are the most progressive individuals in this field: John Cogoli, Erv Dennis, Fred Kagy, Z. A. Prust, and others. Yet, through conversations with many of the 1,700 members, I find few really know the broad scope of the Occupational Safety and Health Act. As Dr. Prust writes: "Many

graphic arts teachers are totally unfamiliar with the context of the . . . Act of 1970."¹

Through my research, I find that very few educators have contributed to a better understanding of the Act and its implications on the educational system. Most available literature has been written by industrial personnel for the business-oriented establishments. It does not surprise me to find that the business and industrial community has only a dim notion of what the Act contains. Niel Head of the National Federation of Independent Businesses said: "They've drawn up the regulations so it would take a Philadelphia lawyer to figure them out."²

I do not profess to be a Philadelphia lawyer; however, the purpose of this paper is (1) to clarify the scope of the Williams-Steiger Occupational Safety and Health Act of 1970, (2) to ascertain if the public educational system is subject to its jurisdiction, (3) if indeed the educational system must comply, how does it specifically affect the graphic arts instructor on the secondary level, and (4) to identify standards which will concern graphic arts teachers on the secondary level and make a composite reference for ease of application by the educators.

¹Z. A. Prust, "Are Your Facilities Meeting Safety Standards?," Visual Communications Journal, (Spring 1974), p. 7.

²"Growing Furor Over Safety Rules For Workers," U. S. News and World Report, Vol. 122 (June 26, 1972), p. 42.

CHAPTER I

BACKGROUND TO THE OCCUPATIONAL SAFETY AND HEALTH ACT

We have all read of the "sweat" shops which plagued the working class less than a century ago. Before most states passed the workmen's compensation law in 1920, it was virtually impossible for an employee to receive any justified compensation for a work-related injury. The employee not only had to prove the accident was received at his place of employment, but he must also prove the accident could not have been avoided. The legal procedure of such cases lingered indefinitely. Excluding the lawyer's fee, the worker rarely received much compensation.¹

The first attempt to promote working standards for the American laborer was the passage of the Walsh-Healey Act in 1936. All efforts to enforce its minimal standards were feeble. Only 22 inspectors were available to cover 29 million workers "protected" under the law.²

In 1968, a new occupational safety and health bill was introduced. It proposed the Health, Education, and Welfare Department and the Department of Labor jointly established a nationwide consensus standard. A research program to develop standards was to be organized,

¹David Peter Sachs, "Work At Your Own Risk," Saturday Review, (June 6, 1970), p. 64.

²Sachs, p. 65.

and both departments were to have strict enforcement rights. It failed to pass, as did a similar bill in 1969.³

A glance at a graph published in the U.S. News and World Report indicates to this writer why the Act passed in 1970.

Disabling Work Injuries Per Million Man-Hours
in All Manufacturing Industries

Year	Injuries	Year	Injuries
1958	11.4	1966	13.8
1960	12.2	1968	14.0
1962	12.0	1970	15.2
1964	12.5		

For a better understanding, we will convert 1970 figures into more realistic terms. The 15.2 represents 14,000 killed and 2.2 million disabling on-the-job accidents.⁴ Mr. Edward Campbell reduces these figures to even smaller units of measurement. There is one death in industry every 37 minutes, two every hour, 39 every day, and 270 every week. Also, a worker experiences a disabling injury every 14 seconds; 250 every hour; 6,000 every day; and 42,000 every week.⁵

³Sachs, p. 65.

⁴U.S. News, (June 26, 1972), p. 42.

⁵Edward A. Campbell, Ph.D., Safety Manual for the Graphic Arts Industry (Education Council of the Graphic Arts Industry, Inc., and the National Safety Council, 1972), p. 2.

Accidents in the printing and publishing industries have doubled in the last 10 years.⁶ One in every 50 persons have suffered time-loss, permanent disability, or fatal injury.⁷

⁶Kathleen Spangler, "Safety in the Graphic Arts," Graphic Arts Progress, Vol. 19 (September 1972), p. 4.

⁷"Health and Safety Notes," Health and Safety News, Vol. 1 (April 1972); p. 3.

CHAPTER II

THE OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

According to Congress, many of the state safety and health plans proved to be inadequate.¹ The aforementioned statistics seem to varify this assumption of deteriorating working conditions and safety practices. Consequently, on December 29, 1970, the 91st Congress passed the Williams-Steiger "Occupational Safety and Health Act," or OSHA. Its purpose is

. . . to assure safe and healthful working conditions for working men and women; by authorizing enforcement for the standards developed under the Act; by assisting and encouraging the States in their efforts to assure safe and healthful working conditions; by providing for research, information, education, and training in the field of occupational safety and health; and for other purposes.²

In Section 2(b), the Congress makes known this additional purpose: " . . . to assure so far as possible every working man and woman in the Nation, safe and healthful working conditions and preserve our human resources." Mr. Richard E. Gallagher, Deputy Assistant Director for Regional Operations, National Institute for Occupational Safety and Health, tends to be more direct in his opinion of OSHA: "We're

¹"OSHA and the States," Health and Safety News, Vol. 1 (December 1972), p. 1.

²Public Law 91-596, "Occupational Safety and Health Act of 1970," (December 29, 1970), p. 1.

³Public Law 91-596, p. 1.

trying to catch up with 50 years of neglect by Government, management, and labor."⁴

The Act gives the Secretary of Labor the authority to promulgate Federal safety and health standards, which will affect every private employer with one or more employees in businesses dealing with commerce: from the dock-hand in San Francisco, to the Mississippi cotton field, along the assembly lines in Detroit, to the cattle-rancher in Texas.⁵ It was estimated that 4.1 million businesses and 57 million workers were to be covered by this legislation.⁶

Those workplaces not covered by the Act were those already under the jurisdiction of existing Federal laws: the Coal Mine Health and Safety Act; the Federal Metal and Non-Metallic Safety Act; Federal, state, and local government employees; . . . ⁷

In its infancy, OSHA was to develop through three stages. The first phase might be termed emergency. Existing Federal standards and available national consensus standards were adopted as mandatory standards to be followed by business and industry. Once this was accomplished, the second phase was designed to revise these standards

⁴Richard E. Gallagher, "Setting Priorities for NIOSH Research," Monthly Labor Review, (March 1975), p. 42.

⁵"Occupational Safety and Health Act," Environmental Control Report, Vol. 2 (September 1971), p. 1.

⁶"For Employers and Workers: Answers On Safety Regulations," U.S. News and World Report, Vol. 122 (June 14, 1971), p. 63.

⁷Wallace L. Johnston, "The Law and School Shops," School Shop, Vol. 34 (February 1975), p. 52.

to make them suitable for mandatory enforcement. Stage three began in 1972 and was to develop entirely new standards in areas where few or no standards existed.⁸ These first three stages were developmental years--building years. OSHA experienced the same growing pains as any new business, institution, or government agency might encounter.

OSHA Standards

The administration and enforcement responsibilities of the Act rest squarely on the shoulders of the Secretary of Labor. The Secretary of Health, Education, and Welfare is responsible for the research in developing criteria for safety and health standards and related functions. For the most part, these functions of Health, Education, and Welfare will be carried out by the National Institute for Occupational Safety and Health, a newly created agency.⁹

To promote safe and healthful working conditions for 57 million American working men and women, the Congress mandated the Labor's OSHA Administration to adopt established Federal standards and any existing national consensus standards.¹⁰ The National Fire Protection Agency and the American National Standards Institute were the greatest contributors since their published standards were already being observed

⁸"OSHA and Mandatory Consensus Standards," Material Research and Standard, Vol. 12 (June 1972), p. 30.

⁹Recordkeeping Requirements Under the Williams-Steiger Occupational Safety and Health Act of 1970 (U.S. Department of Labor, 1971), p. 4.

¹⁰Public Law 91-596, Section 6(a), p. 4.

by responsible employers.¹¹ The American Society for Testing and Materials has since joined this elite group as a major standard-producing organization.¹²

The problem facing the OSHA Administration was to revise all existing standards for suitable enforcement. They were to be written in a language easily understood by the employer and easily retrieved or located.¹³ To compound this problem, it was found that many of the original data supporting the standards were no longer available. Consequently, it became impossible to compare new practices or devices against the original parameters.¹⁴

From the date of enactment until April 28, 1973, the Secretary of Labor had the power to promulgate as occupational safety and health standards from existing Federal standards or any national consensus standards by merely publishing them in the Federal Register. He must now comply to the rule-making requirements of the Administrative Procedure Act

. . . the promulgation of standards under this section of the Act [Section 6(b)(2)] must be done under the procedures set forth in the section itself, including various time limitations, and also under the procedures of the Administrative Procedure Act [Section 6(8)(c)(3)(f)]. Any person adversely affected by a standard issued by the Secretary

¹¹U.S. News (June 26, 1972), p. 43.

¹²"ASTM Recognized," Health and Safety News (March 1973), p. 4.

¹³Alexander J. Reis, "Three Years of OSHA: The View From Within," Monthly Labor Review (March 1975), p. 36.

¹⁴Material Research and Standard, p. 30.

may challenge its validity by petitioning the United States Court of Appeals within 60 days after its promulgation. Unless otherwise ordered by the Court, filing such a petition does not operate as a stay of the standard. Also, the Act provides for the establishment of emergency temporary standards, effective immediately upon publication in the Federal Register, where it is found that employees are exposed to grave danger.¹⁵

This Act is most unique, the standards are not specific components of the law; regulations are promulgated over a period of time. Another unusual feature of the Act is that it allows employers the opportunity to develop substitute standards if they can demonstrate their standards are an improvement over those presently existing.¹⁶

The Federal Register

It is through the publication of the Federal Register that the standards and other communications are brought to the attention of industry and the public at large.

Whenever the Secretary promulgates any standard, makes any rule, order, or decision, grants any exemption or extension of time, or compromises, instigates, or settles any penalty assessed under this Act, he shall include a statement of the reasons for such action, which shall be published in the Federal Register.¹⁷

The Secretary is also instructed by the Act to determine a priority for the establishment of standards. He must give due regard to the urgency of needed standards relating to particular industries, trades,

¹⁵Recordkeeping Requirements, p. 5.

¹⁶Public Law 91-596, Section 6(d), p. 7.

¹⁷Public Law 91-596, Section 6(g), p. 8.

crafts, occupations, businesses, workplaces, or work environment.¹⁸

In this endeavor, the Labor Department has focused their attention on industries with high injury and death statistics and those occupations involving hazardous health substances: asbestos, lead, silica, cotton dust, and carbon monoxide.¹⁹

There are two kinds of standards: temporary standards and standards. The enforcement of the temporary standard becomes immediate upon the publication of the standard in the Federal Register. This standard is issued only if employees are exposed to grave danger from substances or agents determined to be toxic or physically harmful.²⁰ Temporary standards remain in effect until superseded by a standard promulgated in accordance with prescribed procedures.²¹ The Secretary is required to promulgate a standard no later than six months after the original publication of the temporary standard in the Federal Register.²²

Within 30 days after the publication of a temporary standard, any person adversely affected by the standard may submit written data or comments to the Secretary requesting a hearing. The Secretary will then publish in the Register the objection, the time, and the place

¹⁸Public Law 91-596, Section 6(g), p. 8.

¹⁹The Target Health Hazards, OSHA 2051 (U.S. Department of Labor, 1972), p. 1.

²⁰Public Law 91-596, Section 6(c)(1), p. 7.

²¹Public Law 91-596, Section 6(c)(2), p. 7.

²²Public Law 91-596, Section 6(c)(3), p. 7.

for the hearing.²³ And, within 90 days after the first publication or 60 days after the hearing, the Secretary must rule to promulgate, modify, revoke, or determine if a ruling should not be issued.²⁴

Those persons adversely affected by a standard may challenge its validity with the United States Court of Appeals within 60 days after publication. A copy of the court's findings will be sent to the Secretary. However, the determination of the Secretary shall be conclusive if he feels the standard is properly substantiated with evidence to support it.²⁵

The effective date of a standard may be delayed up to 90 days to permit employers and employees the opportunity to become informed of the compliances in the standard.²⁶

Standards will not remain static! Many revisions have been made; more than 100 revisions are now in this process.²⁷

Most of the standards appearing in the Federal Register relate to safety. Health standards are being developed more slowly due to the scarcity of reliable information on the causes of occupational illnesses.²⁸

²³Public Law 91-596, Section 6(a)(2), p. 5.

²⁴Public Law 91-596, Section 6(a)(4), p. 5.

²⁵Public Law 91-596, Section 6(f), p. 8.

²⁶Public Law 91-596, Section 6(a)(4), p. 5.

²⁷Frank R. Barnako, "Enforcing Job Safety: A Managerial View," Monthly Labor Review (March 1975), p. 37.

²⁸U.S. News (June 26, 1972), p. 44.

There are two basic essential ingredients to be incorporated into every valid safety and health standard. First, it must identify the hazard. Second, it must specify what must be done to prevent its occurrence.²⁹ A member of the Atlanta, Georgia, Business and Industrial Association said, "Employees want to comply if they only knew how."³⁰ Mr. Harry Verdier, Chief of the Office of Special Programs under the Health, Education, and Welfare Department, explains that "people can't comply with a mandatory standard which promotes safety or health until they know what is expected of them."³¹ And finally, a quote from Mr. Robert D. Moran, Chairman, Occupational Safety and Health Review Commission: "So long as job safety and health standards remain shrouded in ambiguity, the gains we make in safety and health conditions on the job will be equally ambiguous."³²

Ironically, the ultimate success of OSHA is largely dependent on voluntary compliance.³³

OSHA Enforcement/Penalties/Variations

The specifications for compliance are outlined in the Federal Register. When enforcing these standards the

²⁹Robert D. Moran, "Our Job Safety Law Should Say What It Means," National Business, Vol. 62 (April 1974), p. 23.

³⁰U.S. News (June 26, 1972), p. 42.

³¹Material Research and Standard, p. 30.

³²Moran, p. 26.

³³Material Research and Standard, p. 30.

. . . Labor Department safety inspectors, [Section 8(1) and (2)] may enter without delay, and at any reasonable times, any establishment covered by the Act to inspect the premises and all pertinent conditions, structures, machines, apparatus, devices, equipment, and materials therein, and to question privately any employer, owner, operator, agent, or employee.³⁴

Any employer and a representative authorized by the employees may accompany the inspector as he proceeds through the workplace for the purpose of aiding such inspection.³⁵ Surprise visits are the rule, not the exception: "Any person who gives advance notice of any inspection to be conducted under this Act, without authority from the Secretary or his designees, shall, upon conviction, be punished by a fine of not more than \$1,000 or by imprisonment for not more than six months, or by both."³⁶

OSHA inspections of the workplace are increasing yearly at an accelerated rate. In 1972 the annual inspection rate was 13,217 compared to the 1973 average of 110,000 inspections.³⁷

When an investigation of a workplace reveals one or more violations, the employer is issued a written citation by the compliance officer. The only exceptions will be if a laboratory analysis is necessary in determining violations, advice is required from legal or other

³⁴Recordkeeping Requirements, p. 5.

³⁵Public Law 91-596, Section 8(3)(e), p. 11.

³⁶Public Law 91-596, Section 17(f), p. 18.

³⁷Alfred A. Jasser, "OSHA Are You Ready?," Printing Impressions (June 1972), p. 21.

safety and health specialists, and if the necessary documents are not available at or near the work site.³⁸ The citation will describe the nature of the violation and will fix a reasonable time for abatement. The citation must be posted near the place where the violation occurred if multiple locations are involved.³⁹

In addition to being randomly selected for an inspection by a compliance officer, employees who feel a violation of job safety or health standards exist which could result in physical harm may request an inspection. A signed, written statement to the Department of Labor will set the necessary wheels in motion. If the Secretary feels there is inadequate grounds for the complaint, the complainant will be notified and an opportunity for an informal review is extended.⁴⁰ Most employee complaints received by OSHA have been valid; 80 to 85 percent have resulted in an investigation.⁴¹

After the completion of an inspection, the employer will find his workplace falls under one of three possible conditions: it is free of all violations, it has minor infractions and an issuance of a notice in lieu of a citation for de minimis violations (no direct or immediate relationship to safety or health exists) is given, or he is issued a citation.⁴²

³⁸Reis, p. 35.

³⁹Public Law 91-596, Section 9(a) and (b), p. 12.

⁴⁰Public Law 91-596, Section 8(a)(3)(f)(1), p. 11.

⁴¹"Noted Briefly," Health and Safety News (August 1973), p. 7.

⁴²Public Law 91-596, Section 9(a), p. 12.

A non-serious civil violation is assessed up to \$1,000 for each violation.⁴³ An example of a non-serious violation would be improper markings on the floor, or a fire extinguisher improperly hung. A serious violation is when substantial probability that death or serious physical harm could result.⁴⁴ A locked or blocked exit door would be a serious violation. Such violations carry a civil penalty up to \$1,000 for each violation.⁴⁵ A willful or repeated violation of a standard carries a civil penalty of not more than \$10,000 for each violation.⁴⁶ If the willful violation causes death to any employee he shall, upon conviction, be punished by a fine of not more than \$10,000 or by imprisonment for up to six months, or both. A second willful or repeated violation that results in the death of an employee may receive, upon conviction, a penalty of not more than \$20,000 or one year imprisonment, or both.⁴⁷

The failure to correct a violation within the abatement period is subject to a fine of not more than \$1,000 for each day during which the violation continues.⁴⁸

⁴³Public Law 91-596, Section 17(c), p. 17.

⁴⁴Public Law 91-596, Section 17(k), p. 18.

⁴⁵Public Law 91-596, Section 17(b), p. 17.

⁴⁶Public Law 91-596, Section 17(a), p. 17.

⁴⁷Public Law 91-596, Section 17(e), p. 18.

⁴⁸Public Law 91-596, Section 17(d), p. 17.

If an employer knowingly files false statements while complying to the Act, upon conviction, he may be punished by a \$10,000 fine and/or six months imprisonment.⁴⁹ The failure to properly post materials as stipulated in the Act is subject to a \$1,000 fine for each violation.⁵⁰

Contrary to a common misunderstanding, there are no automatic fines; citations propose penalties which do not become final until either there is no notice of contest filed and 15 days lapse, or the decision of the judge (or Review Commission) is made and 30 days lapse following a contested citation.⁵¹

Within 15 working days (Saturday, Sunday, and Federal holidays exempted), the action taken by OSHA Administration becomes final and there is no recourse to the employer. However, the employer retains his full statutory right to contest all or any part of the alleged violation(s), the time allowed for correction (abatement period), and the penalty proposed within this prescribed time limit.⁵²

The notice of contest is filed with the OSHA Area Director. He refers the notice to the Secretary of Labor who then advises the

⁴⁹Public Law 91-596, Section 17(g), p. 18.

⁵⁰Public Law 91-596, Section 17(i), p. 18.

⁵¹"OSHA Review Commission," Health and Safety News, (March 1973), p. 2.

⁵²Health and Safety News (March 1972), p. 3.

Occupational Safety and Health Review Commission. The Commission affords the employer an opportunity for a hearing.⁵³

The Commission is not a part of the Department of Labor. It is an independent agency in the executive branch of the Federal government. OSHRC's functions are to hear and review cases of alleged violations brought before it by the Secretary of Labor; and, where warranted, to issue corrective orders, and to assess civil penalties. It is composed of three members, responsible to and appointed by the President with the advice and consent of the Senate. They are appointed for six-year staggered terms.⁵⁴

To assist the Review Commission in their monumental task, Commission judges, located throughout the country, actually hear and render verdicts on the cases. The Commission members do not hear evidence; they do read the verbatim transcript of the hearing, study the briefs, the judge's opinion, and application of the law as it applies to the facts. They see each and every decision rendered by the Commission judges, and they have 30 days to request a review. This has been initiated in only about 10 percent of the cases. If no review is ordered, the decision of the judge becomes final, automatically, 30 days after the decision was rendered.⁵⁵ Contested decisions before the Commission in 1972 had a five-month backlog of

⁵³Recordkeeping Requirements, p. 6.

⁵⁴Recordkeeping Requirements, p. 9.

⁵⁵Health and Safety News (March 1973), p. 2.

842 cases.⁵⁶ The history of appeals shows that in 43 percent of the cases contested before the Review Commission they assessed no penalty or a lesser amount than was initially proposed by the Labor Department. However, in 15 percent of the cases, the Commission increased the penalty above that previously proposed.⁵⁷

Within 60 days following an order by the Commission, a request for a review by the United States Court of Appeals may be instigated. Its judgment to affirm, modify, or set aside in whole or in part, the order of the Commission, shall be final except its findings are subject to review by the United States Supreme Court. The Commission is instructed to follow these recommendations.⁵⁸

The deadline for correcting violations begins with the final order of the Review Commission.⁵⁹

If an employer is unable to comply to a standard by its effective date due to factors beyond his control, he may request from the Secretary a temporary variance. Factors such as unavailability of professional or technical personnel, lack of material and equipment, or construction cannot be completed on time, would be valid excuses. Personal or monetary considerations are not valid. The employer must

⁵⁶"Struggling for Safety," Time, Vol. 99 (May 22, 1972), p. 87.

⁵⁷Memorandum No. 4, American Newspaper Publishers Association (August 31, 1972), p. 5.

⁵⁸Public Law 91-596, Section 11(a), pp. 13-14.

⁵⁹Public Law 91-596, Section 10(b), p. 12.

assure the Secretary that he is taking all available steps to safeguard his employees against hazards and that he has an effective program for coming into compliance as rapidly as possible.⁶⁰

The employees will be notified by the Secretary and extended an opportunity for a hearing.⁶¹

A temporary variance may be in effect for the period required by the employer to comply to the standard or a period of one year, whichever is shorter. Two temporary variance renewals may be obtained; however, neither is to be in effect for more than 180 days.⁶²

An employer may request an indefinite type of variance. If he can document to the Secretary, by inspection or hearing, that the conditions, practices, means, methods, operations, or processes he is using or intends to use are as effective or more effective than the standard, the Secretary may issue a variance after extending the employees an opportunity to participate in a hearing. This type of variance can be revoked or modified after six months by application from the employer, employees or by the Secretary's own motion.⁶³

⁶⁰Public Law 91-596, Section 6(b)(6), p. 5.

⁶¹Public Law 91-596, Section 6(b)(6), p. 6.

⁶²Public Law 91-596, Section 6(b)(6), p. 6.

⁶³Public Law 91-596, Section 6(d), pp. 7-8.

OSHA Recordkeeping

In order for the Secretary of Labor and the Secretary of Health, Education, and Welfare to carry out the purpose of the Act, they must have valid statistics on which to base their recommendations for future standards, investigations, and experiments. Section 24 of the Act provides for a broad statistical program which is to extend even to employers to whom the enforcement provisions do not apply.⁶⁴

The only employers exempt from this task are those employing less than eight employees during the course of a full year. They must, however, report all fatalities or multiple hospitalization cases to the nearest OSHA District Office.⁶⁵

In the area of safety and health records, the employer is required to complete three forms. OSHA Form No. 100 is the Log of Occupational Injuries and Illnesses. It is used to record each occupational injury or illness, within two days of the occurrence, and is to be retained for five years. OSHA Form No. 101 is the Supplementary Record of Occupational Injuries and Illnesses. This form contains a detailed record of each recordable injury or illness. It must also be retained for five years. OSHA Form No. 102 is the Summary Occupational Injuries and Illnesses record. It is a year-end report to summarize all recordable injuries and illnesses. It must be prepared within one month

⁶⁴Public Law 91-596, Section 24(a), p. 25.

⁶⁵"Oversights Are Not Overlooked," Health and Safety News (August 1973), p. 4.

following the end of the calendar year and be posted in a place accessible to all employees.⁶⁶

The use of the workmen's compensation form is an acceptable substitute for Form No. 101, providing it meets various stipulations. As of November 1973, only eight states could comply: New York, Colorado, Iowa, Wisconsin, Oregon, Montana, Nevada, and Wyoming.⁶⁷

All states are eligible to receive up to 50 percent of the operating costs for their recordkeeping program.⁶⁸

"The primary function of accident records is accident prevention--which is to say safety education."⁶⁹ In the beginning, approximately 250,000 businesses were chosen on a sampling basis to file reports for statistical purposes.⁷⁰ No further mention of this practice is found to indicate if this approach is still being followed or being revised.

One of the major problems with form compliances is its interpretation.

Recently, in one trade association 10 accident reports were submitted to a large number of safety and health

⁶⁶OSHA Report B-201, Man and Manger, Inc. (1974), p. 2.

⁶⁷"Health and Safety Notes," Health and Safety News (November 1973), p. 4.

⁶⁸Public Law 91-596, Section 24(c), p. 26.

⁶⁹Kenneth F. Licht, "School Liability and Safety Education," The Education Digest, Vol. 36 (November 1970), p. 23.

⁷⁰U.S. News (June 14, 1971), p. 63.

professionals for their decision on recordability. The opinion ranged from none, to all, with numerous opinions in-between.⁷¹

Minor injuries requiring only first aid treatment are not to be logged on a record form. If, however, an injury or illness requires medical treatment, loss of consciousness, restriction of work or motion, or the transfer to another job, it must be properly recorded.⁷²

Record forms will be one of the first things the compliance officer will inspect.⁷³

State Participation

The Occupational Safety and Health Act automatically preempted all state enforcement activities with regard to safety and health situations. However, nothing in the Act prevents the state from asserting jurisdiction, under state law, over those issues of safety and health when no standard is in effect, i.e., public agencies of the state and its political subdivisions.⁷⁴

The state is instructed to take positive action to reclaim this loss by submitting a state plan.

Any State which, at any time, desires to assume responsibility for development and enforcement therein of occupational safety and health standards relating to any occupational safety and health issue with respect to which

⁷¹Barnako, p. 39.

⁷²Public Law 91-596, Section 8(c)(2), p. 10.

⁷³OSHA Report B-201, p. 2.

⁷⁴Public Law 91-596, Section 18(a), p. 19.

a Federal standard has been promulgated under Section 6 shall submit a State plan for the development of such standards and their enforcement.⁷⁵

State participation is strictly voluntary. The Act, in hopes of pressuring states to submit a plan, provided grants to aid in the development and maintenance of the program. The government will provide 90 percent of the cost to initiate a state plan and 50 percent of its operating costs thereafter. However, in order to qualify, the state must have submitted a state plan within two and one-half years from the date the bill became law.⁷⁶ In July of 1974, the Secretary of Labor announced grants totaling \$29,182,361 for fiscal 1975.⁷⁷

If a state plan is submitted, and approved by the Secretary of Labor, the Federal enforcement authority can be relinquished after three years. However, a concurrent enforcement jurisdiction is in effect during this interim period. The Secretary is placing the responsibility for inspections and citations in the hands of the state; he is not absolving his authority to monitor state enforcement.⁷⁸

Also, it is not necessary for a state plan to cover everything in the Federal standards. The state may deal only with specific

⁷⁵Public Law 91-596, Section 18(b), p. 19.

⁷⁶Public Law 91-596, Section 23(f) and (g), p. 25.

⁷⁷"Approved Plans," Health and Safety News (October 1974), p. 5.

⁷⁸John J. Sheehan, "OSHA and State Job Safety Plans," Monthly Labor Review, Vol. 97 (April 1974), p. 44.

hazards or certain industries. The remaining standards will still be under Federal jurisdiction.⁷⁹

The Secretary is required to make a continuing evaluation of state plans and withdraw his approval if failure to comply is evident. Withdrawal of a state plan is known as "slippage." Slippage occurred to New York in 1974.⁸⁰ The withdrawal of an approved plan, or the rejection of a proposed plan, is subject to a review in the United States Court of Appeals.⁸¹

In August of 1973, 49 of the 56 eligible states and governmental territories had submitted state plans to the Secretary. Only 10 had been approved.⁸² Mr. Alexander Reis, a member of the Department of Labor, in a speech to the Annual Meeting of the Industrial Relations Research Association in December 1974, said that 26 state plans are now approved.⁸³ As of February 10, 1975, the official number of state approved plans was 21.⁸⁴

⁷⁹Health and Safety News, Vol. 1 (December 1972), p. 2.

⁸⁰"Individual Plans," Health and Safety News (October 1974), p. 6.

⁸¹Public Law 91-596, Section 18(f) and (g), p. 20.

⁸²"State Plans," Health and Safety News (August 1973), p. 7.

⁸³Reis, p. 35.

⁸⁴Kenneth A. Clark, (Personal Correspondence).

One provision which has been incorporated into 20 state plans is the consultation meeting agreement without enforcement action--except for gravely dangerous situations.⁸⁵

Although the former paragraph is sure to bring tears of joy to the employers' eyes, all feelings concerning a state plan are not so well received. Upon close scrutiny by the American Federation of Labor, it was found that state plans failed to meet the "at least as effective" provision as set forth in the Act.⁸⁶ They are also opposed to what they term "defederalization." Their conviction is that by fragmenting the Federal program into 56 jurisdictions, the conditions prevalent before the Act would return. Also, the state is required to give only "assurance" that their occupational safety plan will become as effective as the Federal program at some future date.⁸⁷

Employees may not be happy with all standards outlined in their state plan. Under many plans, the employee is subject to a fine for actions which violate a standard.⁸⁸

⁸⁵"OSHA Three Years Old," Health and Safety News (August 1974) p. 3.

⁸⁶Michael Wood, "Enforcing Job Safety: A Union View of OSHA," Monthly Labor Review (March 1975), p. 41.

⁸⁷Sheehan, p. 45.

⁸⁸Johnston, p. 54.

CHAPTER III

THE OCCUPATIONAL SAFETY AND HEALTH ACT AND ITS

IMPLICATIONS ON THE PUBLIC

EDUCATIONAL SYSTEM

Under the provisions set forth in Section 18 of the Act, states must comply to specific requirements if they intend to regain state control over safety and health jurisdiction. Most important to public educational systems is item (c)(6), which requires the state plan to contain

. . . satisfactory assurance that such State will, to the extent permitted by its law, establish and maintain an effective comprehensive occupation safety and health program applicable to all employees of public agencies of the State and its political subdivisions, which program is as effective as the standards contained in an approved plan.¹

For an official interpretation of this provision, a letter was forwarded to the OSHA District Office. Mr. Kenneth A. Clark, Technical Adviser for Region V, replied: "The educational system is subject to the Federal Standards only in those states with approved plans, or where the state elects to provide this coverage. The coverage under OSHA only applies to the employees of the educational system, not the students--unless the state regulations elect this coverage."²

¹Public Law 91-596, Section 18(c)(6), p. 19.

²Kenneth A. Clark (Personal Correspondence).

Unlike the business and industrial segments of our communities, the public educational system was never removed from state jurisdiction. However, now those states with an approved plan must contain safety and health standards at least as effective as those stipulated in the Federal Register. These standards will apply to every school administrator, every school teacher, and all school staff and maintenance personnel.

Even school systems in states that do not have an approved plan may be under Federal jurisdiction. Those institutions conducting occupational and/or training courses, which are being subsidized by Federal monies authorized by the Department of Labor, are subject to OSHA provisions in these classes.³

Students in a co-operative educational work program have always been covered by the Act.⁴

In this period of economic squeeze and empty public school coffers, an effective safety program can save money. Money is saved by conserving both human and material resources.

"Accidents have so many hidden costs that insurance rarely covers half the total losses."⁵ Medical expenses represent only a fraction

³J. Arlen Marsh, "OSHA: What it means to schools," School Product News (September 1973), p. 3.

⁴John G. Erisman and Michael J. Barnardi, "Instructional Material on Occupational Safety and Health Act," (Unpublished report developed for the State of Illinois, Division of Vocational and Technical Education).

⁵A. A. Smythe, "OSHA: A Ready-Made Safety Program," Inland Printer/American Lithographer, Vol. 169 (May 1972), p. 44.

of the actual cost. It has been estimated that for every dollar spent for medical expenses, an additional four dollars are spent on indirect costs.⁶ Indirect costs can take the form of time spent cleaning up, investigating the accident, preparing reports, substitute pay, possibly court costs, etc.⁷ One out of every 33 students can expect to suffer a serious injury every year.⁸ If your state aid is based on average daily attendance, students absent due to a school related accident are costly in terms of dollars not received. Each year approximately 75,000 teachers require medical attention due to on-the-job accidents. They are twice as likely to be injured in the classroom as are steel mill workers.⁹

A good safety program can also pay dividends in the form of fewer machine repair costs, lower medical and workmen's compensation expenses, decrease in property insurance premiums, etc. One company reduced their fire protection cost by 70 percent through a reliable fire prevention system and safety instruction for fire control.¹⁰

The accident prevention program is " . . . an organized, methodical means of discovering and eliminating or controlling the unsafe

⁶Spangler, p. 5.

⁷Charles W. Foster, "What's Ahead in School Safety?," School Shop, Vol. 31 (April 1972), p. 63.

⁸Kenneth F. Licht, "School Liability and Safety Education," The Education Digest, Vol. 36 (November 1970), pp. 22-3.

⁹Foster, pp. 62-3.

¹⁰Spangler, p. 5.

physical conditions and actions existing in the working environment."¹¹ Education has lagged far behind business and industry in developing effective safety programs.¹² The same kinds of accidents happen in the educational environment as in industry, and they can be prevented in the same way.¹³ W. G. Johnson, former general manager of the National Safety Council, remarks: "I truly believe that a school system with an employee and student population of 10,000 has a wider range of safety problems than a manufacturing plant with 10,000 employees."¹⁴

It is important that the topic of safety be a part of the graduate program for school administrators.¹⁵ Teachers should be made aware of the basic legal principles governing their profession.¹⁶ Regulations are not disregarded intentionally; they are probably overlooked through lack of information and understanding of school law and rules.¹⁷ A valuable aid for everyone concerned would be a handbook stipulating the school policies and practices, local and state regulations, and safety directives.¹⁸

¹¹Spangler, p. 7.

¹²Foster, p. 62

¹³Licht, p. 22.

¹⁴Foster, p. 62.

¹⁵Some writers, like Foster (p. 62), go so far as to claim that safety is rarely, if ever, mentioned in the graduate training of school administrators.

¹⁶Denis J. Kigin, Teacher Liability in School-Shop Accidents (Ann Arbor, Michigan: Parakken Publications, Inc., 1973), p. 7.

¹⁷Kigin, p. 9.

¹⁸Licht, p. 24.

The state offers direction and advice to school systems. It is the responsibility of the district to give overall direction and support to a safety program. The following information has been compiled regarding the initiation of a safety program which will assist schools in complying with OSHA standards:

1. A Board Policy Statement, written by the board and superintendent, clearly defining their safety philosophy should be established. The National School Boards Association has approved a sample policy, No. 1001.71, which can be appropriated through the National Safety Council.^{19,20}

2. The responsibility to implement the policy should be relegated to one individual--a committee cannot be held accountable. He/she should be in an administrative position, not staff. If the school population is in excess of 20,000, a full-time safety specialist or consultant should be encouraged. The safety chairperson is not a policy maker but recommends policies to the superintendent.²¹ The following information is to assist this individual in their task of organizing an effective safety program:

- a. Contact your nearest OSHA District Office; request a copy of the Act; recordkeeping forms 100, 101, and 102; and all rules, regulations and standards published

¹⁹Licht, p. 24.

²⁰Foster, p. 64.

²¹Licht, p. 24.

to date. Read this information and post as per the instructions. Utilize other sources for aid and information.²²

- b. Develop a safety policy to cover violators.
- c. Organize a safety committee: administration, teachers, staff personnel, students, local safety specialist, and others deemed beneficial. You should conduct meetings regularly, and file and post the minutes in a conspicuous location. It is also wise to rotate the employee and student representatives in order to involve as many people as possible.²³
- d. According to the standards outlined in the Federal Register, you should make a critical survey of the facilities and take corrective measures as required. Keep a record of every survey made--including all details. School inspections should be made on a regular basis by the Safety Committee.^{24,25}
- e. Organize seminars and meetings for teachers and staff to promote safety. If districts involve multiple

²²"What to do to Comply," Health and Safety News (April 1972), p. 2.

²³"A Basic Safety Program for a Printing Company," Health and Safety News, Vol. 1 (October 1972), p. 3.

²⁴Health and Safety News (April 1972), p. 2.

²⁵"A Basic Safety Program for a Printing Company," Health and Safety News (October 1972), p. 3.

locations, a "road show" technique might prove beneficial.²⁶

- f. Make certain the people under your jurisdiction are informed in depth about the Act and are kept up to date on new developments.²⁷
- g. Initiate a safety training program. "No subordinate will give more attention to safety than his boss."²⁸ New employees should be indoctrinated to the safety practices of the district.²⁹
- h. Set up an accident reporting and recordkeeping system. Past accidents should be studied for future accident prevention.^{30,31}

A joint survey of school business managers in 1969 conducted by the National Safety Council and the Association of School Board Officials indicated that of the 690 respondents 78 percent kept accident reports. Only 24 percent of these managers analyzed the reports for future accident prevention, and 64 percent indicated they "filed"

²⁶Alfred A. Jasser, "How Employers Can Best Comply With OSHA," Printing Impressions, Vol. 14 (May 1972), p. 11.

²⁷Jasser, p. 11.

²⁸Charles Shapiro, "OSHA: Since You Can't Fight It . . . ," Inland Printer/American Lithographer, Vol. 170 (March 1973), p. 41.

²⁹Health and Safety News (October 1972), p. 3.

³⁰Foster, p. 64.

³¹Licht, p. 23.

(never used) their reports or used them only for insurance or legal purposes. No comparisons were made as to the cost to the district.³²

The legal action from a school-related injury is greater today than in any other period of educational history.³³ From July 1972 to April 1974, the American Vocational Association reported 12 lawsuits entered against its members and 10 cases pending.³⁴ The reasons for the increase in legal action can be closely associated with the expanding school program, greater awareness of successful court actions, and changes in state laws.³⁵

For the most part, the school is dependent on the good will of their community for its existence. A lawsuit seeking damages for pupil's injury tends to widen the chasm of district and community relationship.³⁶ "School administrators are discovering a fact of life that industry recognized long ago: accidents are bad business."³⁷

As in sports, the best safety offense is a good safety defense. The Western Publishing Company has a slogan displayed in their plant which reads: "No job is so important and no service so urgent that we can't take time to work safely."³⁸

³²Foster, p. 63.

³³Kigin, p. 1.

³⁴AVA Member-Gram, American Vocational Association, Vol. 5 (April 8, 1974), p. 3.

³⁵Kigin, p. 7.

³⁶Foster, p. 63.

³⁷Licht, p. 22.

³⁸"Trends in the Graphic Arts," Graphic Arts Monthly, Vol. 45 (January 1973), p. 58.

CHAPTER IV

THE FEDERAL REGISTER AS IT APPLIES TO SECONDARY GRAPHIC ARTS EDUCATION

The mandatory safety and health standards as outlined in the Act, can be found in the Federal Register. The content of this chapter is an analysis of the latest edition: volume 39, number 125, dated Thursday, June 27, 1974.

Due to its sheer volume (326 pages, three columns each, in eight point type), it is believed by this writer that few, if any, graphic arts instructors will ever undertake its reading. It is hoped that by reducing those applicable sections down to a few typewritten pages it will become a useful instrument to promote safe and healthful conditions in every graphic arts classroom.

It was felt by this writer, and his adviser, that to retain the effectiveness of the Register, it would be necessary to remain with the outline writing format as found in the Register.

In those areas which relate to graphic arts but are not generally applicable to secondary education (noise levels, air contaminants), I have incorporated materials from my reading for a better understanding of the industrial concerns. In those sections of this chapter, the material is placed in brackets to indicate that it is not taken from the Federal Register.

Part 1910--Occupational Safety and Health Standards

Subpart D--Walking-Working Surfaces

1910.22 General requirements

(a) Housekeeping (1) All places of employment, passageways, store-rooms, and service rooms shall be kept clean and orderly and in a sanitary condition.

(2) Floors must be clean and dry. Where wet processes are used, drainage shall be maintained, and false floors, platforms, mats, or other dry standing places should be provided where practical.

(3) Floors must be free from protruding nails, splinters, holes, or loose boards.

(b) Aisles and passageways (1) Where mechanical handling equipment is used, sufficient safe clearance shall be allowed.

(2) Permanent aisles and passageways shall be appropriately marked.

(c) Covers and/or guardrails shall be provided to protect personnel from hazards of open pits, . . .

(d) Floor loading protection (2) Load limits for floor and building roofs shall be observed.

1910.23 Guarding floor and wall openings and holes

(a) Protection for floor openings (1) Every stairway floor opening shall be guarded by a standard railing consisting of a top rail, intermediate rail, and posts, and shall have a vertical height of 42

inches. Top rail shall be smooth; intermediate rail approximately halfway between top rail and floor. The ends of the rail shall not overhang the terminal posts.

(c) Protection of open-side floors, platforms, and runways (1) Every open-sided floor or platform four feet or more above a ground level shall be guarded by a standard railing. Toeboards shall be provided if

(i) Persons can pass underneath

(ii) There are moving machines below

(iii) There is equipment with which falling material could create a hazard.

(d) Stairway railings and guards (1) Every flight of stairs having four or more risers shall be equipped with standard stair railings or standard handrails.

1910.25 Portable wood ladders

(b) Materials (1) Ladders shall be free from sharp edges, splinters, or decay.

(d) Care and use of ladders (1) (i) Ladders shall be maintained in a good condition at all times, the joints between the steps and side rails shall be tight, all hardware and fittings securely tight, all hardware and fittings securely attached, and the moving parts shall operate freely without binding or undue play.

(v) Ladders shall be stored to provide ease of access and to prevent danger of accident when withdrawing.

(vi) Ladders shall be stored at a location where they will not be exposed to the elements, have good ventilation, not close to excessive heat or dampness.

(vii) Horizontally stored ladders shall be supported to prevent sagging and permanent set.

(ix) Ladders shall be kept coated with a suitable protective material.

(xi) Ladder rungs shall be kept free of grease and oil.

(2) Safety Precautions (ii) Ladders for which dimensions are specified should not be used by more than one man at a time.

(iv) Ladders shall not be placed in front of door openings toward the ladder unless the door is blocked open, locked, or guarded.

(v) Ladders shall not be placed on boxes, barrels, . . .

(vii) When ascending or descending, the user shall face the ladder.

(viii) Ladders with broken or missing rungs, steps, or cleats, broken side rails, . . . shall not be used; improvised repairs shall not be made.

(xi) Ladders shall not be used for other than its intended purposes.

(xii) Tops of stepladders shall not be used as steps.

(xix) Nonslip braces shall be placed on portable ladders.

1910.26 Portable metal ladders (in addition to the above)

(c) Care and maintenance (2) (i) Ladders must be handled with care and not subject to unnecessary dropping, jarring, or misuse.

(vi) (a) Check side rails for dents or bends, excessive dented rungs; rung-to-side-rail connections; check hardware; check rivets for shear.

Subpart E--Means of Egress

1910.36 General requirements

(b) Fundamental requirements (1) The design of exits and other safeguards shall be such that reliance for safety to life in case of fire or other emergency will not depend solely on any single safeguard.

(8) Every structure shall have at least two means of egress remote from each other.

(d) Maintenance (1) Every exit shall be continuously maintained free of all obstructions or impediments.

1910.36 Means of egress, general

(f) Access to exit (2) A door from a room to an exit or to a way of exit access shall be of the side-hinged, swing type. It shall swing with the exit travel when room is occupied by more than 50 persons or used for a high hazard occupancy. [High school printing labs would be classified as "ordinary hazard," see 1910.156(g)].

(g) Exterior ways of exit access (4) A permanent, reasonably straight path of travel shall be maintained over the required exterior way of exit access.

(k) Maintenance and workmanship (3) Any device or alarm installed to restrict the improper use of an exit shall be so designed and

installed that it cannot, even in cases of failure, impede or prevent emergency use of such exit.

(1) Furnishings and decorations (1) No furnishings, decorations, or other objects shall be so placed as to obstruct exits, access thereto, egress therefrom, or visibility thereof.

(q) Exit marking (1) Exits and exit access shall be marked by a readily visible sign.

(2) Any door, passage, or stairway which is neither an exit nor a way of exit access, and which is so located or arranged as to be likely to be mistaken for an exit, shall be identified by a sign reading "Not an Exit" or similar designation, or shall be identified by a sign indicating its actual character, such as "To Basement," "Store-room," or the like.

(3) Every required sign designating an exit or way of exit access shall be so located and of such size, color, and design as to be readily visible. No decorations, furnishings, or equipment which impair visibility of an exit sign shall be permitted, nor shall there be any brightly illuminated sign (for other than exit purposes), display, or object in or near the line of vision to the required exit sign of such a character as to so detract attention from the exit sign that it may not be noticed.

(4) Every exit sign shall be distinctive in color and shall provide contrast with decorations, interior finish, or other signs.

(5) A sign reading "Exit", or similar designation, with an arrow indicating the direction of travel to reach the nearest exit shall be provided if it is not immediately apparent.

(6) Every exit sign shall be suitably illuminated by a reliable light source giving a value of not less than five-foot candles on the illumination surface. Artificial lights giving illumination to exit signs other than the internally illuminated types shall have screens, discs, or lenses of not less than 25 square inches in area made of translucent material to show red or other specified designating color on the side of the approach.

(7) Each internally illuminated exit sign shall be provided in all occupancies where reduction of normal illumination is permitted.

(8) Every exit sign shall have the word "Exit" in plainly legible letters not less than six inches high, with the principal strokes of letters not less than three-fourths-inch wide.

Subpart G--Occupational Health and Environmental Control

1910.93 Air contaminants

[Since the high school printing department is not plagued with a serious level of air contaminants, I submit the following information from my readings.

The printing industry is not a major contributor to air pollution.¹ However, it has several areas which need monitoring. Ink,

¹Kathleen Spangler, "New Inks for Less Pollution," Graphic Arts Progress, Vol. 19 (July 1972), p. 4.

more than any other single element, is our greatest air contaminator. Not the inks found in the small commercial shops; it's the heatset ink on the large high speed web offset and letterpress machines. Hopefully, the new no solvent or no objectionable solvent inks will eliminate the offensive hydrocarbon emissions.²

Of the approximate 500 air contaminants identified, mostly organic vapors and gases, 75 to 80 are commonly found in the printing plant.³

Set-off spray powder, usually a starch, is classified under OSHA as a nuisance dust. The TLV (Threshold Limit Value, maximum average amount to which a person may be exposed throughout an eight-hour day) is 15 mg/M³ (Milligrams per cubic meter) of total dust, and 5 mg/M³ of dust particles small enough to enter the lungs.^{4]}

1910.94 Ventilation

[This section of the Federal Register deals with the large industrial type ventilating systems and is not applicable to secondary education. The following paragraphs are from my OSHA readings.

In confined areas where high-intensity UV radiation from xenon arcs, xenon-mercury arcs, and carbon arcs are used, adequate ventilation is advisable to prevent the buildup of ozone and oxides of nitrogen.⁵

²Spangler, p. 4.

³"Occupational Safety and Health," Environmental Control Report, Vol. 2 (December 1971), p. 1.

⁴Nelson R. Eldred, "Cutting Down on Spray Powder," Technical Service Report (November 1974), p. 1.

⁵"Criteria Documents," Health and Safety News (March 1973), p. 3.

Since most of us in the high school printing department still utilize the hot type method of composition in one form or another, a word concerning lead, its contaminants, and why proper ventilation is so important might be of interest.

Lead is one of the five major hazardous substances receiving attention from OSHA.⁶ Printing is only one of many areas which use lead in their work: plumbing, telephone and power cable shields, More than 1.6 million employees are exposed to the poisoning effect of lead. It can enter the body by inhalation, absorption through the skin, or by ingestion. If the body content is sufficient, the result is the same--severe gastrointestinal, blood, and central nervous system disorders--even death. Lead is a cumulative poison; it is not eliminated but is stored in the body.⁷

Inhalation of lead dust or fumes is the most frequent means of entry.⁸ Type metal contains between 72 and 94 percent lead, depending on its intended usage. Excess temperature on melting pots and melting furnaces will produce metallic fumes. Also, the lead oxide, or dust, from drossing or cleaning a plunger are means of exposure.⁹ OSHA's permissible lead level is 0.2 milligrams per cubic meter of air for an eight-hour, time-weighted average airborne concentration.¹⁰

⁶Material Research and Standard, p. 30.

⁷OSHA 2051.

⁸OSHA 2051.

⁹"Type Metal Operations," Health and Safety News (August 1973), p. 3.

¹⁰OSHA 2051.

The National Institute of Occupational Safety and Health has recommended the occupational exposure to inorganic lead (metallic lead, lead oxides, and lead salts) be reduced from 0.2 mg to 0.15 mg of lead per cubic meter of air on an eight-hour time-weighted average.¹¹

Enclosure and local exhaust ventilation are the primary means of control. You should vacuum clean all lead dust, and don't ignore personal hygiene.¹²

For more information concerning lead, see Subpart O, 1910.218.]

1910.95 Occupational noise exposure

[The student in the high school printing lab is not likely to be exposed to a noise situation which could impair or damage their hearing. This is not to indicate they should not be aware of the industrial dangers of noise exposure.

Noise, the sound of human progress; the most obnoxious pollutants of man's environment. Whether very loud or very persistent, it can contribute to numerous nervous disorders from tension headaches to a total breakdown.¹³

It has been reported that noise costs American industry four million dollars each year due to accidents and lost production.¹⁴

¹¹Health and Safety News (March 1973), p. 3.

¹²OSHA 2051.

¹³Kathleen Spangler and Ronald Antioco, "NOISE in the Graphic Arts, Graphic Arts Progress, Vol. 19 (June 1972), p. 12.

¹⁴Spangler and Antioco, p. 12.

The average cost per hearing loss claim under workmen's compensation is \$2,000.¹⁵

Permissible Sound Levels¹⁶

Duration per hour (hours)	Sound Level (dBA slow)
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115

Typical Sound Intensities Measured in Decibels on "A" Scale¹⁷

Whisper	20dB
Normal Conversation	50dB
Sports Car or Truck	90dB
Shouted Conversation	90dB
Electric Blender	93dB
Loud Power Lawn Mower	107dB
Rock and Roll Band	138dB
Pain Threshold	140dB

Typical Printing Industry Noise Levels in "A" Scale Decibels¹⁸

Composing Room (Linotype Machines)	88-91
Pressroom (General area)	85-95
Sheet fed (Offset press)	80-85
Offset Press (Delivery end)	90
Bindery (Saddle wire stitcher)	85
Bindery (Folding Machine and general area)	85-90

¹⁵Spangler and Antioco, p. 12.

¹⁶Spangler and Antioco, p. 13.

¹⁷Alfred A. Jasser, "Safety in the Printing and Publishing Industry," Anchor Chemical Company, Inc., New York, p. 8.

¹⁸Jasser, p. 9.

Papermaking and printing rank extremely high among the dangerously noisy industries. It is not surprising to learn that 80 percent of pressmen with four or more year of exposure to this high level of sound have hearing impairments in excess of normal hearing loss due to aging. Quieting the pressroom is not beyond our technological capabilities of the twentieth century.¹⁹

The cost of reducing the factory noise level from 90 decibels to 85 decibels would cost the United States industry approximately 31 billion dollars.²⁰ The cost to curtail this problem during construction is \$1 per square foot; remedial cost would run as high as \$13 per square foot.²¹

Noise control measures applied at the source or along the transmission path (floor, walls, etc.) provide the most effective means of eliminating a potential hazard to hearing. If these two approaches prove impractical, insufficient, or are economically unfeasible, personal ear protection must be considered.²² The employer is responsible to furnish ear protective devices. They may be in the form of ear-plugs, which are convenient and least expensive; earmuffs; or helmets, which suppress bone-conducted noise but are very uncomfortable.²³

¹⁹Spangler and Antioco, p. 13.

²⁰Time, Vol. 104 (July 8, 1974), p. 48.

²¹Spangler and Antioco, p. 14.

²²Environmental Control Report (December 1971), p. 2.

²³Spangler and Antioco, p. 13.

Earmuffs, as well as earplugs, do not hinder communication. In noise fields above 85 decibels, they actually improve hearing capabilities. Most earplugs are capable of reducing sound from 20 to 35 decibels.²⁴ No protective device can reduce the noise level more than 50 decibels because of the significant bone-conduction.²⁵

If a noise level survey is conducted and the level is found to be in excess of control measures, the record must be retained.^{26]}

Subpart H--Hazardous Materials

1910.106 Flammable and combustible liquids

(a) Definitions (9) Closed container shall mean a container as herein defined, so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at ordinary temperatures.

(14) "Flashpoint" means the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

(18) "Combustible liquid" means any liquid having a flashpoint at or above 100°F. (37.8°C.). Combustible liquids shall be divided into two classes as follows:

(i) "Class II liquids" shall include these with flashpoints at or above 100°F. (37.8°C.) and below 140°F. (60°C.).

²⁴Environmental Control Report (December 1971), pp. 2-3.

²⁵Campbell, p. 57.

²⁶"Plant Noise Survey," Health and Safety News (December 1973), p. 2.

(ii) "Class III liquids" shall include those with flashpoints at or above 140°F. (60°C.). Class III liquids are subdivided into two subclasses:

(a) "Class IIIA liquids" shall include those with flashpoints at or above 140°F. (60°C.) and below 200°F. (93.3°C.).

(b) "Class IIIB liquids" shall include those with flashpoints at or above 200°F. (93.3°C.). (Not used in this section).

(19) "Flammable liquid" means any liquid having a flashpoint below 100°F. (37.8°C.). Flammable liquids shall be known as Class I liquids. Class I liquids are divided into three classes as follows:

(i) Class IA shall include liquids having flashpoints below 73°F. (22.8°C.) and having a boiling point below 100°F. (37.8°C.).

(ii) Class IB shall include liquids having flashpoints below 73°F. (22.8°C.) and having a boiling point at or above 100°F. (37.8°C.).

(iii) Class IC shall include liquids having flashpoints at or above 73°F. (22.8°C.) and below 100°F. (37.8°C.).

(29) Safety can shall mean an approved container, of not more than five gallons capacity, having a spring-closing lid and spout cover and so designed that it will safely relieve internal pressure when subjected to fire exposure.

(d) Container and portable tank storage (3) Design, construction, and capacity of storage cabinets (i) Maximum capacity. Not more than 60 gallons of Class I or Class II liquids, nor more than 120 gallons of Class III liquids may be stored in a storage cabinet.

(ii) Fire resistance. Storage cabinets shall be designed and constructed to limit the internal temperature to not more than 325°F. when subjected to a 10-minute fire test. All joints and seams shall remain tight and the door shall remain securely closed during the fire test. Cabinets shall be labeled in conspicuous lettering, "Flammable--Keep Fire Away."

(a) Metal cabinets constructed in the following manner shall be deemed to be in compliance. The bottom, top, door, and sides of cabinet shall be at least No. 18 gage sheet iron and double walled with $1\frac{1}{2}$ -inch air space. Joints shall be riveted, welded or made tight by some equally effective means. The door shall be provided with a three-point lock, and the door sill shall be raised at least 2 inches above the bottom of the cabinet.

(b) Wooden cabinets constructed in the following manner shall be deemed in compliance. The bottom, sides, and top shall be constructed of an approved grade of plywood at least 1 inch in thickness, which shall not break down or delaminate under fire conditions. All joints shall be rabbetted and shall be fastened in two directions with flat-head woodscrews. When more than one door is used, there shall be a rabbetted overlap of not less than 1 inch. Hinges shall be mounted in such a manner as not to lose their holding capacity due to loosening or burning out of the screws when subjected to the fire test.

(7) Fire control (i) Extinguishers. Suitable fire control devices, such as small hose or portable fire extinguishers, shall be available at locations where flammable or combustible liquids are stored.

(b) At least one portable fire extinguisher having a rating of not less than 12-B units must be located not less than 10 feet, nor more than 25 feet, from any Class I or Class II liquid storage area located outside of a storage room but inside a building.

(e) Industrial plants (1) Scope (i) Application. This paragraph shall apply to those industrial plants where:

(a) The use of flammable or combustible liquids is incidental to the principal business.

(2) Incidental storage or use of flammable and combustible liquids (ii) Containers. Flammable or combustible liquids shall be stored in tanks or closed containers.

(b) The quantity of liquid that may be located outside of an inside storage room or storage cabinet in a building or in any one fire area of a building shall not exceed:

(1) 25 gallons of Class IA liquids in containers.

(2) 120 gallons of Class IB, IC, II, or III liquids in containers.

(iv) Handling liquids at point of final use (a) Flammable liquids shall be kept in covered containers when not actually in use.

(b) Where flammable or combustible liquids are used or handled, except in closed containers, means shall be provided to dispose promptly and safely of leakage or spills.

[It is not advisable to store any low-flash liquids (Class 1A or 1B) in a cabinet.²⁷

An open-head waste can cover is now on the market which will extinguish a fire with its own gases. The cover is available without receptacles in sizes to fit 4½-to 55-gallon drums.²⁸ No mention is made as to where they may be purchased.

Solvent soaked shop towels should be placed in an approved safety can. Your fire code may require you to empty them daily. The lid or its mechanism seems to be the major problem with these cans. Their function is to snuff out a fire inside. The lid must fit snugly all around, and stay shut when not in use.²⁹

Use plunger cans where possible. The excess solvent drains back through the baffle into the can.³⁰

The longer hair styles and beards can be a fire hazard. Hair, fire, and oxygen can produce a very serious accident. If a respirator is required on a bearded person, as much as 50 percent of its sealing power can be lost.³¹

²⁷"Flammable Liquids in Manufacturing Areas," Health and Safety News (August 1974), p. 4.

²⁸Arthur M. Stevens, "Handling Flammable Liquids Safely," Inland Printer, Vol. 171 (September 1973), p. 47.

²⁹Stevens, p. 46.

³⁰Stevens, p. 46.

³¹"Long Hair Presents Hazards," Safety Review, Vol. 28 (March 1971), p. 6.

The starch in set-off spray becomes an explosion-hazard when its concentration reaches about 42 g/M³ (0.04 ounces per cubic foot) in the air. Don't clean the press with compressed air--vacuum clean it.³²

Benzene and naphtha have recently been replaced by non-flammable chemicals; yet, most printers don't use these because of the cost. If we consider added student safety an economic asset, and we should, it might be well to invest in the new-generation non-flammable chemicals.³³ One gallon of gasoline, vaporized and mixed with oxygen, has the potential to explode with the force of 83 pounds of dynamite. The vapors from these solvents are heavier than air; consequently, they descend and flow along the floor. A spark from a motor would ignite it.³⁴

We should not forget that glacial acetic acid used as a short-stop solution in the darkroom and many film cleaners are highly flammable.³⁵

By industrial comparison, the National Fire Protection Association places the printing industry near the bottom on a list of fire cost and occurrences. However, during a five-year study, approximately

³²Eldred, p. 1.

³³Stevens, p. 45.

³⁴Ed Herndon, "Is Your Shop Fireproof?," School Shop, Vol. 31 (October 1972), p. 68.

³⁵B. R. Halpern, "Darkroom Safety Chemicals," Graphic Arts Register, Vol. 12 (August 15, 1971), pp. 7-8.

900 printing plant fires were recorded per year. The average fire loss was well over \$6,000.^{36]}

Subpart I--Personal Protective Equipment

1910.132 General requirements

(b) Employee-owned equipment. Where employees provide their own protective equipment, the employer shall be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment.

(c) Design. All personal protective equipment shall be of safe design and construction for the work to be performed.

1910.133 Eye and face protection

(a) General (1) Protective eye and face equipment shall be required where there is a reasonable probability of injury that can be prevented by such equipment. In such cases, employers shall make conveniently available a type of protector suitable for the work to be performed, and employees shall use such protectors. No unprotected person shall knowingly be subjected to a hazardous environmental condition. Suitable eye protectors shall be provided where machines or operations present the hazard of flying objects, glare, liquids, injurious radiation, or a combination of these hazards.

(2) Protectors shall meet the following minimum requirements:

³⁶Stevens, p. 7.

(i) They shall provide adequate protection against the particular hazards for which they are designed.

(ii) They shall be reasonably comfortable when worn under the designated conditions.

(iii) They shall fit snugly and shall not unduly interfere with the movements of the wearer.

(iv) They shall be durable.

(v) They shall be capable of being disinfected.

(vi) They shall be easily cleanable.

(vii) Protectors should be kept clean and in good repair.

(3) Persons whose vision requires the use of corrective lenses in spectacles, and who are required by this standard to wear eye protection, shall wear goggles or spectacles of one of the following types:

(i) Spectacles whose protective lenses provide optical correction.

(ii) Goggles that can be worn over corrective spectacles without disturbing the adjustment of the spectacles.

(iii) Goggles that incorporate corrective lenses mounted behind the protective lenses.

(4) Every protector shall be distinctly marked to facilitate identification only of the manufacturer.

(5) When limitations or precautions are indicated by the manufacturer, they shall be transmitted to the user and care taken to see that such limitations and precautions are strictly observed.

(6) Design, construction, testing, and use of devices for eye and face protection shall be in accordance with American National Standard for Occupational and Educational Eye and Face Protection, Z87.1--1968.

[The Ohio Legislature set a precedent for school eye-safety legislation in 1963. Since then, 31 other states have emulated this action.³⁷ One major disadvantage of these laws is that they don't pinpoint the ultimate responsibility for administering eye safety programs at the local level. Six states fix the responsibility on the local board of education or governing board, while eight states assign this responsibility to the local school administrator. Another eight states charge the "supervising individual." Ten states make no reference to ultimate responsibility.³⁸

The local boards of education in 11 states are required to "purchase and furnish" eye protection to students involved in potentially eye hazardous courses. Also, visitors in such classes shall be provided with protective glasses. The purchase and selling of glasses to students at cost is permitted in four states.³⁹

At the present time, there is no law which requires mandatory sanitation and health procedures; this is left to the discretion of the state.⁴⁰

³⁷Denis Kigin, "Eye Safety and Teacher Liability," School Shop, Vol. 33 (September 1973), p. 49.

³⁸William R. Biggam, "Eye Safety Legislation, The National Scene Today," School Shop, Vol. 31 (April 1972), p. 65.

³⁹Biggam, p. 66.

⁴⁰Biggam, p. 66.

State laws should require suppliers and vendors to submit an affidavit stating their eye protective devices meet or exceed United States standards.⁴¹

Eye injury declines sharply when personal protective devices are required; this can be verified by 50,000 individuals enrolled in the Wise Owl Club. To be initiated, the individual must have experienced a potential eye accident which was prevented by wearing the proper safety equipment.⁴²

An article appearing in the March 1972 issue of Safety Review encourages a 15-minute eye wash with water should acids or alkalines contact the eye. The former attacks the surface; the latter penetrates progressively deeper layers of the eyeball. No attempt should be made to neutralize the acid or alkali. The eyes will be extremely red and sore after 15 minutes, but the student will have another chance to see.⁴³

You are encouraged to contact your state government and state education department for laws governing your classes.]

Subpart J--General Environmental Control

1910.144 Safety color code for marking physical hazards

(a) Color identification (1) Red. Red shall be the basic color for the identification of:

⁴¹Biggam, p. 67.

⁴²Kigin, p. 48.

⁴³"15-Minute Eyewash," Safety Review, Vol. 29 (March 1972), p. 10.

(i) Fire protection equipment and apparatus (a) Fire alarm boxes (pull boxes).

(b) Fire blanket boxes.

(d) Fire exit signs.

(e) Fire extinguishers (if painting the extinguisher is impractical or undesirable, color should be used on the housing, wall, or support to identify the location).

(ii) Danger. Safety cans or other portable containers of flammable liquids having a flashpoint at or below 80°F. and table containers of flammable liquids (open cup tester), excluding shipping containers, shall be painted red with some additional clearly visible identification either in the form of a yellow band around the can or the name of the contents conspicuously stenciled or painted on the can in yellow. Danger Signs shall be painted red.

(iii) Stop. Emergency stop bars on hazardous machines shall be red. Stop buttons or electrical switches on which letters or other markings appear, used for emergency stopping of machinery shall be red.

(2) Orange. Orange shall be used as the basic color for designating dangerous parts of machines or energized equipment which may cut, crush, shock, or otherwise injure and to emphasize such hazards when enclosure doors are open or when gear belt, or other guards around moving equipment are open or removed, exposing unguarded hazards.

(3) Yellow. Yellow shall be the basic color for designating caution and for marking physical hazards such as: striking against, stumbling, falling, tripping, and "caught in between." Solid yellow,

yellow and black stripes, yellow and black checkers (or yellow with suitable contrasting background) should be used interchangeably, using the combination which will attract the most attention in the particular environment.

(4) Green. Green shall be used as the basic color for designating "Safety" and the location of first aid equipment (other than firefighting equipment).

(5) Blue. Blue shall be the basic color for designating caution, limited to warning against the starting, the use of, or the movement of equipment under repair or being worked upon.

(7) Black, white, or combinations of black and white. Black, white, or a combination of these two, shall be the basic colors for the designation of traffic and housekeeping markings. Solid white, solid black, single color striping, alternate stripes of black and white, or black and white checkers should be used in accordance with local conditions.

(b) Color specifications. Colors shall meet the tests specified in section 3, Color Definitions, of ANSI Z53.1--1967, Safety Color Code for Marking Physical Hazards.

1910.145 Specifications for accident prevention signs and tags

(a) Scope (1) These specifications apply to the design, application, and use of signs or symbols intended to indicate and, insofar as possible, to define specific hazards of a nature such that failure to designate them may lead to accidental injury to workers or the public,

or both, or to property damage. These specifications do not apply to plant bulletin boards or to safety posters.

(2) All new signs and replacements of old signs on or after August 31, 1971, shall be in accordance with these specifications.

(b) Definitions. As used in this section, the word "sign" refers to a surface prepared for the warning of, or safety instructions of, industrial workers or members of the public who may be exposed to hazards. Excluded from this definition, however, are news releases, displays commonly known as safety posters, and bulletins used for employee education.

(c) Classification of signs according to use (1) Danger Signs

(i) Danger signs should be used only where an immediate hazard exists. There shall be no variation in the type of design of signs posted to warn of specific dangers and radiation hazards.

(ii) All employees shall be instructed that danger signs indicate immediate danger and that special precautions are necessary.

(2) Caution signs (i) Caution signs shall be used only to warn against potential hazards or to caution against unsafe practices.

(ii) All employees shall be instructed that caution signs indicate a possible hazard against which proper precaution should be taken.

(3) Safety instruction signs. Safety instruction signs shall be used where there is a need for general instructions and suggestions relative to safety measures.

(d) Sign design and colors (1) Design features. The colors, proportions, and location of the identification panels on each sign

shall be in accordance with this paragraph. All signs shall be furnished with rounded or blunt corners and shall be free from sharp edges, burrs, splinters, or other sharp projections. The ends or heads of bolts or other fastening devices shall be located in such a way that they do not constitute a hazard.

(2) Danger signs (i) The colors red, black, and white shall be those of opaque glossy samples as specified in Table 1 of Fundamental Specification of Safety Colors for CIE Standard Source "C", American National Standard Z53.1--1967.

(4) Caution signs (i) Standard color of the background shall be yellow; and the panel, black with yellow letters. Any letters used against the yellow background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standards Z53.1--1967.

(6) Safety instruction signs (i) Standard color of the background shall be white; and the panel, green with white letters. Any letters used against the white background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard, Z53.1--1967.

(7) Directional signs (i) Standard color of the background shall be white; and the panel, black with white directional symbol. Any letters used against the white background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1--1967.

(9) Informational signs. Blue shall be the standard color for informational signs. It may be used as the background color for the

complete sign or as a panel at the top of such types of "Notice" signs, which have a white background. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1--1967.

(e) Sign wordings (2) Nature of wording. The wording of any sign should be easily read and concise. The sign should contain sufficient information to be easily understood. The wording should make a positive, rather than negative suggestion and should be accurate in fact.

(3) Danger signs. Danger--Keep Away. Danger--2,300 Volts. Danger--Keep Out. Danger--Keep Off.

(6) Safety instruction signs. Walk--Don't Run. Report All Injuries No Matter How Slight. Think, If Safe Go Ahead. Make Your Work Place Safe Before Starting the Job. Report All Unsafe Conditions to Your Instructor. Help Keep This Shop Safe and Clean.

(7) Directional Signs. This Way Out (below arrow panel. This Way (inside arrow) Out (below arrow panel). Fire Exit (below arrow panel). Fire (inside arrow) Extinguisher (below arrow panel). To the (inside arrow) Fire Escape (below arrow panel). To the (inside arrow) First Aid (below arrow panel). This Way to (inside arrow) First-Aid Room (below arrow panel).

(f) Accident prevention tags (1) Scope and purpose (i) The tags are a temporary means of warning all concerned of a hazardous condition, defective equipment, etc. The tags are not to be considered as a complete warning method, but should be used until a positive means

can be employed to eliminate the hazard; for example, a "Do Not Start" tag on power equipment shall be used for a few moments or a very short time until the switch in the system can be locked out; a "Defective Equipment" tag shall be placed on a damaged ladder and immediate arrangements made for the ladder to be taken out of service and sent to the repair shop.

(2) Definitions. The word "tag" as used in this paragraph refers to a surface (usually card, paper, pasteboard, or some temporary or nonpermanent material) on which letters or markings, or both, appear. These letters or markings, or both, are for warning (cautioning) or safety instruction of employees who may be exposed to hazards. They are to be affixed to the device in question by string, wire, or adhesive.

(3) Do not start tags (i) The standard background color for Do Not Start tags shall be red.

(ii) Letters shall be white or grey or etched, provided that a long lasting and sharp contrast results.

(iii) Do Not Start tags shall be placed in a conspicuous location or shall be placed in such a manner that they effectively block the starting mechanism which would cause hazardous conditions should the equipment be energized.

(4) Danger tags (i) Danger tags should be used only where an immediate hazard exists. There should be no variation in the type of design of tags posted or hung to warn of specific dangers.

(ii) All employees should be instructed that Danger tags indicate immediate danger and that special precautions are necessary.

(5) Caution tags (i) Caution tags should be used only to warn against potential hazards or to caution against unsafe practices.

(ii) All employees should be instructed that Caution tags indicate a possible hazard against which proper precautions should be taken.

(6) Out of order tags. Out of Order tags should be used only for the specific purpose of indicating that a piece of equipment, machinery, etc., is out of order and to attempt to use it might present a hazard.

Subpart K--Medical and First Aid

1910.151 Medical services and first aid

(a) The employer shall ensure the ready availability of medical personnel for advice and consultation on matters of plant health.

(b) In the absence of an infirmary, clinic, or hospital in near proximity to the workplace which is used for the treatment of all injured employees, a person or persons shall be adequately trained to render first aid. First aid supplies approved by the consulting physician shall be readily available.

(c) Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

Subpart L--Fire Protection

1910.156 Definitions applicable to this subpart

(a) "Class A fires" are fires in ordinary combustible materials, such as wood, cloth, paper, and rubber.

(b) "Class B fires" are fires in flammable liquids, gases, and greases.

(c) "Class C fires" are fires which involve energized electrical equipment where the electrical nonconductivity of the extinguishing media is of importance. (When electrical equipment is deenergized, extinguishers for Class A or B fires may be used safely).

(e) Classification of portable fire extinguishers: "Portable fire extinguishers" are classified for use on certain classes of fires and rated for relative extinguishing effectiveness at a temperature of plus 70°F. by nationally recognized testing laboratories.

(g) An "ordinary hazard" is a situation where the amount of combustibles or flammable liquids present is such that fires of moderate size may be expected. These may include mercantile storage and display, auto showrooms, parking garages, light manufacturing, warehouses not classified as extra hazard, school shop areas, etc.

1910.157 Portable fire extinguishers

(a) General requirements (1) Operable condition. Portable extinguishers shall be maintained in a fully charged and operable condition, and kept in their designated places at all times when they are not being used.

(2) Location. Extinguishers shall be conspicuously located where they will be readily accessible and immediately available in the event of fire. They shall be located along normal paths of travel.

(3) Marking of location. Extinguishers shall not be obstructed or obscured from view. In large rooms, and in certain locations where visual obstruction cannot be completely avoided, means shall be provided to indicate the location and intended use of extinguishers conspicuously.

(4) Marking of extinguishers. If extinguishers intended for different classes of fire are grouped, their intended use shall be marked conspicuously to insure choice of the proper extinguisher at the time of a fire.

(5) Mounting of extinguishers. Extinguishers shall be installed on the hangers or in the brackets supplied, mounted in cabinets, or set on shelves unless the extinguishers are of the wheeled type.

(6) Height of mounting. Extinguishers having a gross weight not exceeding 40 pounds shall be installed so that the top of the extinguisher is not more than five feet above the floor. Extinguishers having a gross weight greater than 40 pounds (except wheeled types) shall be so installed that the top of the extinguisher is not more than $3\frac{1}{2}$ feet above the floor.

(7) Cabinet mounting. Extinguisher mounted in cabinets or wall recesses or set on shelves shall be placed in a manner such that the extinguisher operating instructions face outward. The location of such extinguishers shall be marked conspicuously.

(b) Selection of extinguishers (2) Selection by hazard (i) Extinguishers shall be selected for the specific class or classes of hazards to be protected in accordance with the following paragraphs.

(ii) Extinguishers for protecting Class A hazards shall be selected from among the following: foam, loaded stream, multipurpose dry chemical, and water types. Certain smaller extinguishers which are charged with multipurpose dry chemical are rated on Class B and Class C fires, but have insufficient effectiveness to earn the minimum 1-A rating even though they have value in extinguishing smaller Class A fires.

(iii) Extinguishers for protection of Class B hazards shall be selected from the following: bromotrifluoromethane, carbon dioxide, dry chemical, foam, loaded stream, and multipurpose dry chemical. Extinguishers with ratings less than 1-B shall not be considered in determining suitability.

(iv) Extinguishers for protection of Class C hazards shall be selected from the following: bromotrifluoromethane, carbon dioxide, dry chemical, and multipurpose dry chemical.

Note: Carbon dioxide extinguishers equipped with metal horns are not considered safe for use on fires in energized electrical equipment and, therefore, are not classified for use of Class C hazards.

(c) Distribution of portable fire extinguishers (1) General (i) The number of fire extinguishers needed to protect a property shall be determined by considering the area and arrangement of the building or

occupancy, the severity of the hazard, the anticipated classes of fires, and the distances to be traveled to reach extinguishers.

(v) Extinguishers provided for building protection may be considered also for the protection of occupancies having a Class A fire potential.

(2) Fire extinguisher size and placement for Class A hazards.

Basic minimum extinguisher rating for area specified	Maximum travel distances to extinguishers (feet)	Area to be protected per extinguisher
		Ordinary hazard occupancy (sq. feet)
1A	75	*
2A	75	3,000
3A	75	4,500
4A	75	6,500
6A	75	9,000

*Not permitted except as specified in subdivision (ii) as follows:

(ii) The protection requirements specified above may be fulfilled by several extinguishers of lower ratings for ordinary or extrahazard occupancies.

(iii) Where the floor area of a building is less than that specified, at least one extinguisher of the minimum size recommended shall be provided.

(iv) The protection requirements may be fulfilled with extinguishers of higher rating provided the travel distance to such larger extinguishers shall not exceed 75 feet.

(3) Fire extinguisher size and placement for Class B fires other than for fires in flammable liquids of appreciable depth.

(i) For a Class B fire in an "ordinary" hazard situation, the basic minimum extinguisher rating should be 8B and maximum travel distance to the extinguisher should not exceed 50 feet.

(ii) Two or more extinguishers of lower rating, except for foam extinguishers, shall not be used to fulfill the protection requirements stated in the previous paragraph. Up to three foam extinguishers may be used to fulfill these requirements.

(iii) The protection requirements may be fulfilled with extinguishers of higher ratings provided the travel distance to such larger extinguishers shall not exceed 50 feet.

(5) Fire extinguisher size and placement for Class C hazards

(i) Extinguishers with Class C ratings shall be required where energized electrical equipment may be encountered which would require a nonconducting extinguishing media. This will include fire either directly involving or surrounding electrical equipment. Since the fire itself is a Class A or Class B hazard the extinguishers are sized and located on the basis of the anticipated Class A or B hazard.

(d) Maintenance (ii) Extinguishers removed from the premises to be recharged shall be replaced by spare extinguishers during the period they are gone.

(iv) Each extinguisher shall have a durable tag securely attached to show the maintenance or recharge date and the initials or signature of the person who performs this service.

Subpart O--Machinery and Machine Guarding

1910.211 Definitions

(c) (1) "Bite" means the nip point between any two inrunning rolls.

(d) (11) "Device" means a press control or attachment that:

(i) Restrains the operator from inadvertently reaching into the point of operation, or

(ii) Prevents normal press operation if the operator's hands are inadvertently within the point of operation.

(17) "Two hand control device" means a two hand trip that further requires concurrent pressure from both hands of the operator during a substantial part of the closing portion of the stroke of the press.

(26) "Feeding" means the process of placing or removing material within or from the point of operation.

(27) "Automatic feeding" means feeding wherein the material or part being processed is placed within or removed from the point of operation by a method or means not requiring action by an operator on each stroke of the press.

(29) "Manual feeding" means feeding wherein the material or part being processed is handled by the operator on each stroke of the press.

(30) "Foot control" means the foot operated control mechanism designed to be used with a clutch or clutch/brake control system.

(31) "Foot pedal" means the foot operated lever designed to operate the mechanical linkage that trips a full revolution clutch.

(32) "Guard" means a barrier that prevents entry of the operator's hands or fingers into the point of operation.

(34) "Fixed barrier guard" means a space barrier attached to the press frame.

(35) "Interlocked press barrier guard" means a barrier attached to the press frame and interlocked so that the press stroke cannot be started normally unless the guard itself, or its hinged or movable sections, enclose the point of operation.

(43) "Operator's station" means the complete complement of controls used by or available to an operator on a given operation for stroking the press.

(44) "Pinch point" means any point other than the point of operation at which it is possible for a part of the body to be caught between the moving parts of a press or auxiliary equipment, or between the material and moving part or parts of the press or auxiliary equipment.

(45) "Point of operation" means the area of the press where material is actually positioned and work is being performed.

(55) "Trip or (tripping)" means activation of the clutch to "run" the press.

(57) "Two-hand trip" means a clutch actuating means requiring the concurrent use of both hands of the operator to trip the press.

(f) Mechanical power-transmission guarding terms (5) "Flywheels" include flywheels, balance wheels, and flywheel pulleys mounted and revolving on crankshaft of engine or other shafting.

(7) "Nip-point belt and pulley guard" means a device which encloses the pulley and is provided with rounded or rolled edge slots through which the belt passes.

(8) "Point of operation" means that point at which cutting, shaping, or forming is accomplished upon the stock and shall include such other points as may offer a hazard to the operator in inserting or manipulating the stock in the operation of the machine.

(10) "Sheaves" mean grooved pulleys, and shall be so classified unless used as flywheels.

1910.212 General requirements for all machines

(a) Machine guarding (1) Types of guarding. One or more methods of machine guarding shall be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, and rotating parts. Examples of guarding methods are--barrier guards, two-hand tripping devices, electronic safety devices, etc.

(2) General requirements for machine guards. Guards shall be affixed to the machine where possible and secured elsewhere if for any reason attachment to the machine is not possible. The guard shall be such that it does not offer an accident hazard in itself.

(3) Point of operation guarding (ii) The point of operation of machines whose operation exposes an employee to injury, shall be guarded. The guarding device shall be in conformity with any appropriate standards therefore, or, in the absence of applicable specific standards, shall be so designed and constructed as to prevent the operator from having any part of his body in the danger zone during the operating cycle.

(iv) The following are some of the machines which usually require point of operation guarding: (a) Guillotine cutters.

(d) Power presses. (f) Power saws. (h) Portable power tools.

(i) Forming rolls and calenders.

(5) Exposure of blades. When the periphery of the blades of a fan is less than seven (7) feet above the floor or working level, the blades shall be guarded. The guard shall have openings no larger than one-half ($\frac{1}{2}$) inch.

(b) Anchoring fixed machinery. Machines designed for a fixed location shall be securely anchored to prevent walking or moving.

1910.213 Machine construction general

(a) (6) Circular saw fences shall be so constructed that they can be firmly secured to the table or table assembly without changing their alignment with the saw. For saws with tilting tables or tilting arbors the fence shall be so constructed that it will remain in a line parallel with the saw, regardless of the angle of the saw with the table.

(7) Circular saw gages shall be so constructed as to slide in grooves or tracks that are accurately machined, to insure exact alignment with the saw for all positions of the guide.

(9) All belts, pulleys, gears, shafts, and moving parts shall be guarded in accordance with the specific requirements of 1910.219.

(b) Machine controls and equipment (1) A mechanical or electrical power control shall be provided on each machine to make it possible

for the operator to cut off the power from each machine without leaving his position at the point of operation.

(3) On applications where injury to the operator might result if motors were to restart after power failures, provision shall be made to prevent machines from automatically restarting upon restoration of power.

(4) Power controls and operating controls should be located within easy reach of the operator while he is at his regular work location, making it unnecessary for him to reach over the cutter to make adjustments. This does not apply to constant pressure controls used only for setup purposes.

(5) On each machine operated by electric motors, positive means shall be provided for rendering such controls or devices inoperative while repairs or adjustments are being made to the machines they control.

(6) Each operating treadle shall be protected against unexpected or accidental tripping.

(7) Feeder attachments shall have the feed rolls or other moving parts so covered or guarded as to protect the operator from hazardous points.

(c) Hand-fed saw (1) Each circular hand-fed saw shall be guarded by a hood which shall completely enclose that portion of the saw above the table and that portion of the saw above the material being cut. The hood and mounting shall be arranged so that the hood will

automatically adjust itself to the thickness of and remain in contact with the material being cut but it shall not offer any considerable resistance to insertion of material to saw or to passage of the material being sawed. The hood shall be made of adequate strength to resist blows and strains incidental to reasonable operation, adjusting, and handling, and shall be so designed as to protect the operator from flying splinters and broken saw teeth. It shall be made of material that is soft enough so that it will be unlikely to cause tooth breakage. The material should not shatter when broken, should be non-explosive, and should be no more flammable than wood. The hood shall be so mounted as to insure that its operation will be positive, reliable, and in true alignment with the saw; and the mounting shall be adequate in strength to resist any reasonable side thrust or other force tending to throw it out of line.

(q) (1) Knives shall be guarded to prevent accidental contact with knife edge, at both front and rear.

(s) Inspection and maintenance of machinery (2) All knives and cutting heads of machines shall be kept sharp, properly adjusted, and firmly secured. Where two or more knives are used in one head, they shall be properly balanced.

(3) Bearings shall be kept free from lost motion and shall be well lubricated.

(4) Arbors of all circular saws shall be free from play.

(6) Emphasis is placed upon the importance of maintaining cleanliness around machinery, particularly as regards the effective functioning

of guards and the prevention of fire hazards in switch enclosures, bearings, and motors.

1910.217 Mechanical power presses

(a) General requirements (1) New installations. The requirements of this section pertaining to construction shall apply to all mechanical power presses installed on or after August 31, 1971.

(2) Former installations. All mechanical power presses installed prior to August 31, 1971, shall be brought into conformity with the requirements of this section not later than August 31, 1974.

(4) Reconstruction and modification. It shall be the responsibility of any person reconstructing, or modifying a mechanical power press to do so in accordance with paragraph (b) of this section.

(b) Mechanical power press guarding and construction, general

(2) Brakes. Friction brakes provided for stopping or holding movement shall be inherently self-engaging by requiring power or force from an external source to cause disengagement. Brake capacity shall be sufficient to stop the motion quickly and capable of holding its attachments at any point in its travel.

(4) Foot pedals (treadle) (i) The pedal mechanism shall be protected to prevent unintended operation from falling or moving objects or by accidental stepping onto the pedal.

(ii) A pad with a nonslip contact area shall be firmly attached to the pedal.

(iii) The pedal return spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, or designed to prevent interleaving of spring coils in event of breakage.

(iv) If pedal counterweights are provided, the path of the travel of the weight shall be enclosed.

(5) Hand operated levers (i) Hand-lever-operated power presses shall be equipped with a spring latch on the operating lever to prevent premature or accidental tripping.

(6) Two-hand trip (i) A two-hand trip shall have the individual operator's hand controls protected against unintentional operation and have the individual operator's hand controls arranged by design and construction and/or separation to require the use of both hands to trip the press and use a control arrangement requiring concurrent operation of the individual operator's hand controls.

(ii) Two-hand trip systems on full revolution clutch machines shall incorporate an antirepeat feature.

(7) Machines using part revolution clutches (i) The clutch shall release and the brake shall be applied when the external clutch engaging means is removed, deactivated, or deenergized.

(ii) A red color stop control shall be provided with the clutch/brake control system. Momentary operation of the stop control shall immediately deactivate the clutch and apply the brake. The stop control shall override any other control, and reactivation of the clutch shall require use of the operating (tripping) means which has been selected.

(iv) The "Inch" operating means shall be designed to prevent exposure of the workers hands within the point of operation by:

(a) Requiring the concurrent use of both hands to actuate the clutch, or

(b) Being a single control protected against accidental actuation and so located that the worker cannot reach into the point of operation while operating the single control.

(v) Two-hand controls for single stroke shall conform to the following requirements:

(a) Each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press.

(b) The control system shall be designed to permit an adjustment which will require concurrent pressure from both hands during the closing portion of the stroke.

(c) The control system shall incorporate an antirepeat feature.

(d) The control systems shall be designed to require release of all operators' hand controls before an interrupted stroke can be resumed. This requirement pertains only to those single-stroke, two-hand controls manufactured and installed on or after August 31, 1971.

(8) Electrical (i) A main power disconnect switch capable of being locked only in the Off position shall be provided with every power press control system.

(ii) The motor start button shall be protected against accidental operation..

(c) Safeguarding the point of operation (1) General requirements

(i) It shall be the responsibility of the employer to provide and insure the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press.

(ii) The requirement of subdivision (i) of this subparagraph shall not apply when the point of operation opening is one-fourth inch or less.

(2) Point of operation guards (i) Every point of operation guard shall meet the following design, construction, application, and adjustment requirements:

(a) It shall prevent entry of hands or fingers into the point of operation by reaching through, over, under or around the guard:

(b) It shall conform to the maximum permissible openings of Table O--10;

(c) It shall, in itself, create no pinch point between the guard and moving machine parts;

(d) It shall utilize fasteners not readily removable by operator, so as to minimize the possibility of misuse or removal of essential parts;

(e) It shall facilitate its inspection, and

(f) It shall offer maximum visibility of the point of operation consistent with the other requirements.

(iii) A fixed barrier guard shall be attached securely to the frame of the press.

(3) Point of operation devices (i) Point of operation devices shall protect the operator by:

(a) Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or

(c) Preventing the operator from inadvertently reaching into the point of operation at all times.

(e) Inspection, maintenance, and modification of presses (1) Inspection and maintenance records. It shall be the responsibility of the employer to establish and follow a program of periodic and regular inspections of his power presses to insure that all their parts, auxiliary equipment, and safeguards are in a safe operating condition and adjustment. The employer shall maintain records of these inspections and the maintenance work performed.

(2) Modification. It shall be the responsibility of any person modifying a power press to furnish instructions with the modification to establish new or changed guidelines for use and care of the power press so modified.

(3) Training of maintenance personnel. It shall be the responsibility of the employer to insure the original and continuing competence of personnel caring for, inspecting, and maintaining power presses.

(f) Operation of power presses (3) Work area. The employer shall provide clearance between machines so that movement of one operator will not interfere with the work of another. Ample room for cleaning machines, handling material, work pieces, and scrap shall also be

provided. All surrounding floors shall be kept in good condition and free from obstructions, grease, oil, and water.

1910.218 Forging machines

(a) General requirements (1) Use of lead. The safety requirements of this subparagraph apply to lead casts or other use of lead in the forge shop or die shop.

(i) Thermostatic control of heating elements shall be provided to maintain proper melting temperature and prevent overheating.

(ii) Fixed or permanent lead pot installations shall be exhausted.

(iii) Portable units shall be used only in areas where good, general room ventilation is provided.

(iv) Personal protective equipment (gloves, goggles, aprons, and other items) shall be worn.

(v) A covered container shall be provided to store dross skimmings.

(vi) Equipment shall be kept clean, particularly from accumulations of yellow lead oxide.

(2) Inspection and maintenance. It shall be the responsibility of the employer to maintain all forge shop equipment in a condition which will insure continued safe operation. This responsibility includes:

(i) Establishing periodic and regular maintenance safety checks and keeping records of these inspections.

(ii) Scheduling and recording inspection of guards and point of operation protection devices at frequent and regular intervals.

(iv) All overhead parts shall be fastened or protected in such a manner that they will not fly off or fall in event of failure.

1910.219 Mechanical power-transmission apparatus

(a) General requirements (1) This section covers all types and shapes of power-transmission belts, except the following when operating at two hundred and fifty (250) feet per minute or less: (i) Flat belts one (1) inch or less in width, (ii) flat belts two (2) inches or less in width which are free from metal lacings or fasteners, (iii) round belts one-half ($\frac{1}{2}$) inch or less in diameter; and (iv) single strand V-belts, the width of which is thirteen thirty-seconds ($\frac{13}{32}$) inch or less.

(2) Vertical and inclined belts (paragraphs (e) (3) and (4) of this section) if not more than two and one-half ($2\frac{1}{2}$) inches wide and running at a speed of less than one thousand (1,000) feet per minute, and if free from metal lacings or fastenings may be guarded with a nip-point belt and pulley guard.

(b) Prime-mover guards (1) Flywheels. Flywheels located so that any part is seven (7) feet or less above floor or platform shall be guarded in accordance with the requirements of this subparagraph:

(i) With an enclosure of sheet, perforated, or expanded metal, or woven wire:

(ii) With guard rails placed not less than fifteen (15) inches nor more than twenty (20) inches from rim. When flywheel extends into

pit or is within 12 inches of floor, a standard toeboard shall also be provided.

(iv) For flywheels with smooth rims five (5) feet or less in diameter, where the preceding methods cannot be applied, the following may be used: A disk attached to the flywheel in such manner as to cover the spokes of the wheel on the exposed side and present a smooth surface and edge, at the same time providing means for periodic inspection. An open space, not exceeding four (4) inches in width, may be left between the outside edge of the disk and the rim of the wheel if desired, to facilitate turning the wheel over. Where a disk is used, the keys or other dangerous projections not covered by disk shall be cut off or covered. This subdivision does not apply to flywheels with solid web centers.

(d) Pulleys (1) Guarding. Pulleys, and parts of which are seven (7) feet or less from the floor or working platform, shall be guarded in accordance with the standards specified in paragraphs (m) and (o) of this section.

(2) Location of pulleys (i) Unless the distance to the nearest fixed pulley, clutch, or hanger exceeds the width of the belt used, a guide shall be provided to prevent the belt from leaving the pulley on the side where insufficient clearance exists.

(ii) Where there are overhanging pulleys on line, jack, or countershafts with no bearing between the pulley and the outer end of the shaft, a guide to prevent the belt from running off the pulley should be provided.

(3) Broken pulleys. Pulleys with cracks, or pieces broken out of rims, shall not be used.

(e) Belt, rope, and chain drives (1) Horizontal belts and ropes (i) Where both runs of a horizontal belt are 42 inches or less from the floor, the belt shall be fully enclosed in accordance with paragraphs (m) and (o) of this section.

(5) Cone-pulley belts (i) The cone belt and pulley shall be equipped with a belt shifter so constructed as to adequately guard the nip point of the belt and pulley. If the frame of the belt shifter does not adequately guard the nip point of the belt and pulley, the nip point shall be further protected by means of a vertical guard placed in front of the pulley and extending at least to the top of the largest step of the cone.

(iii) If the cone is located less than 3 feet from the floor or working platform, the cone pulley and belt shall be guarded to a height of 3 feet regardless of whether the belt is endless or laced with raw-hide.

(f) Gears, sprockets, and chains (1) Gears. Gears shall be guarded in accordance with one of the following methods:

(i) By a complete enclosure; or

(iii) By a band guard covering the face of gear and having flanges extended inward beyond the root of the teeth on the exposed side or sides. Where any portion of the train of gears guarded by a band guard is less than six (6) feet from the floor, a disk guard or a complete enclosure to the height of six (6) feet shall be required.

(3) Sprockets and chains. All sprocket wheels and chains shall be enclosed unless they are more than seven (7) feet above the floor or platform. Where the drive extends over other machine or working areas, protection against falling shall be provided. This subparagraph does not apply to manually operated sprockets.

(4) Openings for oiling. When frequent oiling must be done, openings with hinged or sliding self-closing covers shall be provided. All points not readily accessible shall have oil feed tubes if lubricant is to be added while machinery is in motion.

(g) Guarding friction drives. The driving point of all friction drives when exposed to contact shall be guarded, all arm or spoke friction drives and all web friction drives with holes in the web shall be entirely enclosed, and all projecting belts on friction drives where exposed to contact shall be guarded.

(h) Keys, setscrews, and other projections (1) All projecting keys, setscrews, and other projections in revolving parts shall be removed or made flush or guarded by metal cover. This subparagraph does not apply to keys or setscrews within gear or sprocket casings or other enclosures, nor to keys, setscrews, or oilcups in hubs of pulleys less than twenty (20) inches in diameter where they are within the plane of the rim of the pulley.

(2) It is recommended, however, that no projecting setscrews or oilcups be used in any revolving pulley or part of machinery.

(j) Bearings and facilities for oiling. Self lubricating bearings are recommended and all drip cups and pans shall be securely fastened.

(m) Standard guards--general requirements (1) Materials

(i) Standard conditions shall be secured by the use of the following materials. Expanded metal, perforated or solid sheet metal, wire mesh on a frame of angle iron, or iron pipe securely fastened to floor or to frame of machine.

(ii) All metal should be free from burrs and sharp edges.

(iii) Wire mesh should be of the type in which the wires are securely fastened at every cross point either by welding, soldering, or galvanizing, except in case of diamond or square wire mesh made of No. 14 gage wire, 3/4-inch mesh or heavier.

(2) Methods of manufacture (i) Expanded metal, sheet or perforated metal, and wire mesh shall be securely fastened to the frame by one of the following methods:

(a) With rivets or bolts spaced not more than five (5) inches center to center. In case of expanded metal or wire mesh, metal strips or clips shall be used to form a washer for rivets or bolts.

(b) By welding to the frame every four (4) inches.

(c) By weaving through channel or angle frame, or if No. 14 gage 3/4-inch mesh or heavier is used, by bending entirely around rod frames.

(e) Diamond or square mesh made of crimped wire fastened into channels, angle or round-iron frames, may also be used as a filler in guards. Size of mesh shall correspond to Table O--12.

(iii) All joints of framework shall be made equivalent in strength to the material of the frame.

(n) Disk, shield, and "U" guards (2) Shield guards (i) A shield guard shall consist of a frame filled in with wire mesh, expanded, perforated, or solid sheet metal.

(o) Approved materials (1) Minimum requirements

(2) Wood guards (i) Wood guards may be used in the woodworking and chemical industries. In all other industries, wood guards shall not be used.

(5) Guardrails and toeboards (i) Guardrail shall be [thirty-six (36) to]⁴⁴ forty-two (42) inches in height, with midrail between top rail and floor.

(iii) Toeboards shall be two [(2) to six (6)]⁴⁵ inches or more in height, of wood, metal, or of metal grill not exceeding one (1) inch mesh.

(p) Care of equipment (1) General. All power-transmission equipment shall be inspected at intervals not exceeding 60 days and be kept in good working condition at all times.

(6) Care of belts (iii) Where possible, dressing should not be applied when belt or rope is in motion; but, if this is necessary, it should be applied where belts or rope leave pulley, not where they approach. The same precautions apply to lubricating chains. In the case of V-belts, belt dressing is neither necessary nor advisable.

⁴⁴"Health and Safety Notes, Health and Safety News, 1:3 (April 1972).

⁴⁵"Health and Safety Notes, Health and Safety News, p. 4 (November 1973).

[As the following chart indicates, most printing accidents involve machinery.

Machinery (37%)	
Folding machines, cutters, stitchers	17%
Presses	17%
Saws	3%
Handling Objects (31%)	
Lifting (strain)	14%
Tools	7%
Handtrucks	4%
Chemical	3%
Eye	3%
Others (32%)	
Struck by objects	14%
Falls	9%
Stepping on or striking objects	7%
Miscellaneous	2% 46

Physical factors are responsible for about 15 percent, while carelessness is responsible for the remaining 85 percent.⁴⁷ Machines are absolute and allow no irregularity in their enforcement. They are inanimate objects which have no consideration for inexperience or momentary carelessness.⁴⁸

Manufacturers of new industrial machinery will be attempting to comply to OSHA if they expect to stay in business. Many equipment companies have "guard kits" available for guarding in-running nips and rotational mechanisms for the most-used presently and recently-manufactured equipment.^{49]}

⁴⁶Health and Safety News (April 1972), p. 4.

⁴⁷Campbell, p. 2.

⁴⁸Kigin, Teacher Liability in School-Shop Accidents, p. 6.

⁴⁹"Machine Guarding," Health and Safety News (August 1974), p. 1.

Subpart P--Hand and portable powered tools

1910.242 (a) General requirements. Each employer shall be responsible for the safe condition of tools and equipment used by employees, including tools and equipment which may be furnished by employees.

(b) Compressed air used for cleaning. Compressed air shall not be used for cleaning purposes except where reduced to less than 30 p.s.i. and then only with effective chip guarding and personal protective equipment.

Subpart S--Electrical

1910.308 Application

(b) Purpose of the National Electrical Code (1) The purpose of the National Electrical Code is the practical safe-guarding of any persons and of buildings and their contents from hazards arising from the use of electricity for light, heat, power, radio, signaling, and for other purposes. The standards contained therein are occupational safety and health standards to the extent that they safeguard any person who is an employee of an employer.

(2) The National Electrical Code contains basic minimum provisions considered necessary for safety.

[The National Electrical Code of 1971 gives specifications for original construction, standards for remodeling, renovation, change, and replacement. However, it fails to provide preventive maintenance standards for existing equipment possibly 10 years old or older in many

cases. Old buildings, improper utilization of areas, temporary installations still in operation years later, all contribute to an unsafe electrical environment.⁵⁰

The extension cord and portable extension light are the two most misused and abused items in the shop.⁵¹ A cord that is too long can make a motor overwork and possibly burn out. A cord that is too light can overheat, be damaged, and become a shock hazard. A cord with excess appliances connected to it is a poor substitute for permanent wiring.⁵² A shock from a 110 or lower voltage circuit can be fatal if the body contact is firm and especially if it is wet.⁵³

Dampness is a good conductor of electricity. Touching an ungrounded electrical object, such as a darkroom viewing light, or electrical socket, with wet hands from the developer, short-stop or fixing solution can send you reeling. All electrical equipment, unless properly grounded, is a potential hazard.⁵⁴

⁵⁰John K. Corwin, "PMI for Electrical Safety," School Shop, Vol. 31 (April 1972), p. 68.

⁵¹Corwin, p. 69.

⁵²"Extension Cord Alert," Safety Review, Vol. 28 (September 1971), p. 13.

⁵³"Taming Shock Hazards," Safety Review, Vol. 28 (February 1971), p. 14.

⁵⁴B. R. Halpern, "Electrical safety in the darkroom," Graphic Arts Register, Vol. 11 (No Date), p. 6.

Consider purchasing double-insulated portable hand tools for added safety to your students, and always use a wooden ladder when working with electrical equipment.⁵⁵

The follow list of electrical questions was prepared by John K. Corwin for publication in the April, 1972 issue of School Shop. You may want to present this list to your qualified electrical maintenance representative.

- (1) When was the last time a power load check of available service in respect to consumed load was run or calculated? What were the results?
- (2) When was the last time a leakage current check was run on portable hand tools, fixed rotating equipment, isolation transformers, the vacuum cleaner, or any other piece of electrical/electronic equipment which comes in contact with the student?
- (3) When was the last time the utility service outlets were checked for polarity, proper grounding and tension?
- (4) When was the last time small and major appliances were checked for leakage and proper grounding?
- (5) When was the last time a safety check was made on service outlets for A-V equipment and any other devices that will be plugged into them?
- (6) When was the last time A-V equipment was checked for proper grounding and current leakage?
- (7) Do you have electrical safety records, do you have preventive maintenance records, and where are they kept?^{56]}

⁵⁵Safety Review (February 1971), p. 7.

⁵⁶Corwin, p. 68.

CHAPTER V

CONCLUSIONS

In the March 1975 issue of the Monthly Labor Review, the Senate Subcommittee on Labor was very critical of the OSHA Administration and many of its methods.¹ Their statistics seem to support their contentions. But I think we need to look more deeply than just the peripheral surfaces of OSHA. We should not be blinded by many of its shortcomings or our own prejudices. We must consider what is best for all American men and women who must spend eight hours in every working day earning a livable wage. The underlying principle of the Act--safe and healthful working conditions for the nation's work force--is commendable. A foundation for future progress has been established. Representative Steiger, co-sponsor of the Act, made this recent comment: "The Act by itself and the standards themselves do not make a safe or more healthful workplace environment."² The success or failure of the Act rests with everyone.

Assistant Secretary of Labor, John Stender, feels 1975 will be a turning-point for OSHA. The image of OSHA has been doing things to

¹Wood; p. 41.

²William A. Steiger, "OSHA: Four Years Later," Labor Law Journal, Vol. 25 (December 1974), p. 727.

employers rather than for them and this image will be reversed.³ I agree with his thinking!

Regardless of whether the Act succeeds or fails, those of us in the educational system must succeed in our safety program. The Act is not a panacea for all of our safety problems. It is another instrument to aid in our success. We should use it in pursuit of an elusive, but not unattainable goal--not a single accident or injury.

Abraham Lincoln once said, "Next to creating life, the greatest thing man can do is save a life."

³Job Safety & Health (Washington, D. C.: U. S. Department of Labor, 1975), p. i.

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The following library resources were utilized

Applied Science and Technology Index
Current Index to Journals in Education
Education Index
Public Affairs Information
Readers Guide to Periodical Literature
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